STUDIES ON NORTH AMERICAN BEES OF THE GENUS *HYLAEUS*. 5. THE SUBGENERA *HYLAEUS*, S. STR. AND *PARAPROSOPIS* (HYMENOPTERA: COLLETIDAE)

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Abstract: The Nearctic representatives of the two subgenera *Hylaeus*, s. str. and *Paraprosopis* are considered in this paper. Within *Hylaeus*, s. str., eleven nominate species are recognized, one of these with a morphologically differentiated subspecies. One species (*H. granulatus*) is removed from synonymy, one new species (*H. sejunctus*) is described from the southwestern United States, and one name (*H. gaigei*) is transferred to the subgenus *Prosopis*. The distribution and morphological variation of several species are treated in detail, and the hypothesis is advanced that one species (*H. stevensi*) may be adventive from the Palearctic fauna. A key is given for all Nearctic species and facial views of the heads of both sexes of most species, and the male apical ventrites are illustrated.

Fourteen Nearctic species of *Paraprosopis* are recognized and included in the key to the species. Two new species (*H. lunicraterius*, *H. timberlakei*) are described from Idaho and California, respectively. The species *H. hydrangeae* is transferred from the subgenus *Metziella* to *Paraprosopis* as a synonym of *H. georgicus*. The distribution of most species is discussed and facial characteristics and male apical ventrites of all species are figured.

The present paper is a continuation of those comprising the series in Literature Cited (Snelling, 1966 a, b, c; 1968), and includes all the species assigned to the nominate subgenus and to *Paraprosopis*. One additional paper, treating the subgenus *Prosopis* in greater detail than my earlier paper (1966a) is in preparation. Hopefully, the series will conclude with a treatment of the species of Mexico and Central America.

HYLAEUS S. STR.

The nominate subgenus is, in the Nearctic Region, one of the larger groups in numbers of species. Except for the ubiquitous *H. cressoni* (Cockerell), however its component species are less abundant than those of *Prosopis* and *Paraprosopis*. As is the case of *Prosopis, Hylaeus s.* str., is Holarctic and most of the species are Palaearctic. Our fauna is closely allied to that of the Old World, and one species, *H. ellipticus* (Kirby) shows definite affinities with a small complex of Old World species. Its nearest relative seems to be

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H. cardioscapus Cockerell, of Siberia. The females, especially, are difficult to separate.

Our species are definitely of boreal origin and seem to have only comparatively recently invaded the more arid regions of the Southwest. Thus, of the eleven species here recognized, only one is a true xerophile. One other species has evolved a xeric subspecies. Of the remainder all save one are essentially northern and/or montane in distribution. The one exception seems to be restricted to the relatively cool sand dune areas along the California coast.

That the invasion of the New World is a phenomenon of long standing is attested by the extensive southern distribution of the group and by the development of several rather distinctive groups of species. The most primitive of our species seems to be *H. ellipticus* which extends from as far north as the Firth River in the Northwest Territories south to California, Arizona and New Mexico. From Alaska on the west *H. ellipticus* ranges eastward across Canada to the Atlantic Coast in Nova Scotia. From there it ranges south as far as North Carolina and Tennessee at the high elevations in the Appalachians.

Another essentially boreal species is *H. verticalis* (Cresson). The northern limit of this species is unknown to me although I have a few specimens from scattered localities in southern Alaska. It occurs as far south as California, Arizona and New Mexico in the western states, and North Carolina and Tennessee in the eastern. At its southern extremities *H. verticalis* occurs only at high elevations.

Two species comprise the *H. conspicuus* group: *H. conspicuus* (Metz) and *H. maritimus* Bridwell. Both are highly modified from the usual pattern of the *H. cressoni* group, but seem, nonetheless, to be related to that assemblage through *H. rudbeckiae* (Cockerell and Casad). *Hylaeus conspicuus* is the more common and widely distributed, extending along the Pacific Coast states from British Columbia south to southern California. Eastward the range includes northern Nevada and Utah, Idaho, Wyoming and Montana. Although often locally abundant *H. conspicuus* is of sporadic occurrence and is seldom represented in collections by large series. Far more restricted in distribution, *H. maritimus* is known only from coastal sand dunes of California from Sonoma County south to Santa Barbara County.

The one completely isolated species in the Nearctic fauna is *H. stevensi.* This species seems to be unrelated to any species in the Nearctic fauna. This species is most abundant in the north-central and northwestern states, but does not extend very far into Canada. In many samples which I have seen from these areas it is obviously the dominant species of *Hylaeus*. Beyond this region its occurrence is spotty but it may be locally very abundant. For example, it is quite common along the San Joaquin River, ten miles west of Turlock, Stanislaus County, California, where it frequents *Melilotus* spp. At Turlock, where I collected intensively for about ten years, it appears to be very rare.

The remaining group is apparently entirely Nearctic in distribution. This is the *H. cressoni* group which includes, in addition to *H. cressoni* itself, *H. fedorica* (Cockerell), *H. labiatifrons* (Cockerell), *H. rudbeckiae* (Cockerell and Casad), *H. saniculae* (Robertson) and *H. sejunctus*, n. sp.

The most common, and most widely distributed, member of this group is *H. cressoni* which extends transcontinentally from southern Canada to northern Mexico. Its elevational amplitude exceeds that of all other species in the subgenus, extending from sea level in California to altitudes in excess of 9500 feet in the same state and at the same latitude. Perhaps in response to this extensive distribution, *H. cressoni* has produced a welter of varietal forms, a number of which have been formally named. I recognize only the form which inhabits the southwestern deserts as a valid subspecies. Several additional species are very closely related to *H. cressoni* and their females are extremely difficult to separate from those of *H. cressoni.* Of these species, only *H. rudbeckiae* is at all common and widely distributed, and its range is nearly as extensive as that of *H. cressoni*, the species being absent only from very arid regions. The only other member of the group other than *H. cressoni mesillae* to occur in desert areas is the new species *H. sejunctus*; this species, obviously derived from *H. cressoni*, occurs sporadically in desert regions in southern California and Nevada, western Arizona and extreme northwestern Mexico. Three species, *H. fedorica, H. labiatifrons* and *H. saniculae* are found in the midwestern and eastern states. All are rare and very poorly known.

It is not very difficult to visualize the evolution of the *H. cressoni* group from a more primitive bee such as *H. ellipticus.* Such requires only a reduction in size and in punctation, together with some modification of the male secondary characters (scape configuration, extent and orientation of facial maculae). By a similar reasoning, the *H. conspicuus* group can be derived from the same source, through an intermediary form such as *H. rudbeckiae.* The larger size, larger and more clearly defined sculpturation and Holarctic distribution of the *H. ellipticus* group favor the conjecture that this is the more primitive of the two groups. The *H. verticalis* group appears to be still less specialized, and our one representative is structurally a more variable species.

From the above sketchy commentary on our species of *Hylaeus*, s. str., it should be obvious that the species of this subgenus will prove difficult to identify. This particularly is true of those which I have assigned to the *H. cressoni* group. In the key which follows one should not experience any difficulty with the females until those couplets dealing with the *H. cressoni* group are reached (Nos. 7-12). I have been forced to rely on characters which are, at best, exceedingly difficult to work with, and the results are far from satisfactory. During the preparation of this portion of the key, an AO-Spencer binocular microscope, with 18x ocular eyepieces and 6x objectives, was used. A five unit measuring reticle, divided into twenty subunits was used, this calibrated against a stage micrometer for conversion into millimeters. Facial measurements were made with the head in full-face view, *i.e.*, the head so positioned as to produce maximum distance between the clypeal apex and the posterior head margin. Head length is a useful character although even slight overall size increase usually results in a disproportionate increase in the development of the vertex; this does not become apparent until one has examined many specimens. Far less variable, and hence more useful for some purposes, is the maximum measurable distance between the clypeal apex and the anterior margin of the anterior ocellus, along the mid-line of the face. This I have called the *facial length*. With the head positioned as indicated above, a measurement of the maximum width, across the compound eyes, is made to yield the *head width*. This measurement is subject to some allometric variation and hence is less useful than desired, but its alternative, *facial width* (maximum measurable distance *between* the eyes at the level of the antennal sockets) is less easily made with precision and is only slightly less variable.

Characters of punctation have also been used to separate females within the *H. cressoni* group. These are subtle and difficult to express, and until one has become somewhat familiar with the various species, they are very difficult to appreciate. Unfortunately, there is a considerable amount of variation, especially in *H. cressoni*, and many (about 15% of those I have studied) females cannot be keyed satisfactorily. The alternative was to bring all females of this group to a single couplet without any attempt to separate them. Others may wish to adopt this alternative and stop keying at couplet 7. Tentative determinations may then be made on the basis of associated males, although this is hazardous since there are few areas where but a single species is found, although in any area one species will be dominant, usually *H. cressoni*.

The portion of the key separating the males should present few difficulties. Two forms (*H. cressoni mesillae* and *H. sejunctus*) are separated by differences in the shape of the ninth ventrite since no reliable external features have been discovered. All specimens from the southern California deserts, southwestern Nevada, the western third of Arizona and adjacent portions of northwestern Mexico must be separated in this manner. Specimens from the remaining areas of the southwestern deserts will all be *H. cressoni mesillae* or intergrades to the typical form (these are particularly common in Utah and Texas). Males of the other species may also be identified simply by comparison with the figures of the faces; these are quite distinctive for each species.

KEY TO *HYLAEUS*, S. STR.

1. Females 2
   Males 13
2. Anterior coxae not distinctly angulate laterally; facial foveae ending no more than one-fourth of distance between eyes and lateral ocelli; pronotal collar distinctly shorter medially than laterally; pronotal collar usually maculate 3
   Anterior coxae distinctly angulate laterally; facial foveae ending about

one-third of distance between eyes and lateral ocelli; pronotal collar usually as long medially as laterally; pronotal collar immaculate............ ....*verticalis* (Cresson)

3. Oblique propodeal carina evanescent or absent; lateral carina evanescent or absent above; mesopleura very densely tesselate, punctures obscure; if mesopleura densely tesselate above only, *then* genae broader than eyes 4
   Oblique and lateral propodeal carinae usually well-defined; mesopleurae frequently punctate and shiny above, if densely tesselate and impunctate, than genae narrower than eyes.. 5
4. Entire mesopleuron densely tesselate, dull, punctures very obscure; genae, seen from side, distinctly narrower than eyes; median length of basal zone of propodeum much shorter than median length of postscutellum; clypeus usually extensively maculate............*conspicuus* (Metz)
   Mesopleuron moderately shiny and punctate on lower half; genae, seen from side, distinctly broader than eyes; median length of basal zone of propodeum subequal to median length of postscutellum; clypeus immaculate..*maritimus* (Bridwell)
5. Mesopleural punctures extremely coarse, several times diameter of those of vertex, distinctly larger than those of mesocutum, integument dull, densely tesselate; postscutellum with deep, distinct coarse punctures, frequently appearing rugose..................................*stevensi* (Crawford)
   Mesopleural punctures little, if any coarser than those of vertex or mesocutum; punctures of postscutellum usually obscure, never coarse.... 6
6. Lateral and oblique carinae very strongly developed; transverse carina present, high; entire basal area coarsely rugose; mesopleura deeply, uniformly punctate; postscutellum dull, densely tesselate and roughened; larger species, length to apex of second tergite 5.5-6.7 mm; clypeus frequently with transverse, apical macula..............*ellipticus* (Kirby)
   Lateral and oblique carinae variable, but usually rather faint; transverse carina usually absent; basal area rarely entirely rugose; if rugose, *then* mesopleura tesselate on upper half, punctures sparse, obscure; postscutellum usually slightly shiny, often with evident punctures; smaller, slender species, length to apex of second tergite 2.7-4.2 mm.................. 7
7. Head width 1.40 mm or more, usually about 1.5 mm; facial length 1.2 mm or more..*rudbeckiae* (Cockerell and Casad)
   Head width not exceeding 1.31 mm; facial length not exceeding 1.2 mm 8
8. Punctures of mesocutum fine, separated by 1.5 or more times a puncture diameter; interspaces very densely tesselated so that integument is dull.. 9
   Punctures of mesocutum coarser, separated by about a puncture diameter or less; interspaces usually somewhat shiny; if densely tesselate, punctures quite close...10

9. Punctures of mesocutellum medially distinctly closer than those on either side, interspaces somewhat polished..........,............*sejunctus* Snelling
   Punctures of mesocutellum medially little, if any, closer than those on either side, interspaces slightly shining, distinctly tesselated..*cressoni mesillae* (Cockerell)
10. Clypeus and lower half of supraclypeal area tesselate, but slightly shining with extremely fine longitudinal striolae..11
    Clypeus and lower half of supraclypeal area very densely tesselate, appearing almost granular, without fine longitudinal striolae...*fedorica* (Cockerell)
11. Pronotal collar immaculate...12
    Pronotal collar maculate; tegulae maculate; clypeus either maculate apically or strongly suffused with light reddish..*cressoni cressoni* (Cockerell)
12. Facial maculae well-developed; tubercules and basal two-thirds of front tibiae maculate..*cressoni cressoni* (Cockerell)
    Facial maculae greatly reduced or absent; tubercules immaculate; front tibiae with small basal spot..*saniculae* (Robertson)
13. Sides of face without conspicuous oval concavity; clypeus rarely marked with black 14
    Sides of face, slightly above level of antennal sockets, with a conspicuous oval concavity; lateral face marks narrow, elongate; clypeus usually partially infuscated along lower margins..................*saniculae* (Robertson)
14. Antennal scape broad, its greatest width equal to one-half or more its length 15
    Antennal scape narrower, its greatest width not exceeding 0.47 times its greatest length 19
15. Scape more or less dilated, strongly flattened to concave beneath; lateral face marks variable..16
    Scape robust, thick, hardly, if at all, flattened beneath; lateral face marks curving away from eye margins over antennal sockets (Fig. 2H)...*verticalis* (Cockerell)
16. Lateral face marks above well-removed from inner orbits and conspicuously dilated or clavate above (Figs. 2C, D, J); transverse propodeal carina evanescent or absent..17
    Lateral face marks above not separated from eye margin, but with pointed median extension ending over antennal sockets (Fig. 2C); transverse propodeal carina sharply defined....................*ellipticus* (Kirby)
17. Scape no more than 0.58 times as broad as long; concave surface black, with at most a narrow yellow stripe along lower margin; mesopleura distinctly punctate..18
    Scape at least 0.70 times as broad as long, concave under surface wholly yellow, with broad yellow stripe along lower margin which

expands above onto convex surface, (Fig. 2J); mesopleura densely tesselate and roughened, without conspicuous punctures........................ .... *conspicuus* (Metz)

18. First flagellar segment subequal to second; rugulae of basal area of propodeum not attaining posterior margin; the rugulae longitudinal, widely spaced; oblique carina absent; lateral face marks slightly constricted above leval of clypeus, separated from inner orbits by less than their width at constriction (Fig. 2D)...........................*maritimus* Bridwell
First flagellar segment half, or less, as long as second; basal area of propodeum rugoso-reticulate to posterior margin; oblique carina present, face marks strongly constricted, separated from inner orbits by much more than their minimum width at constriction (Fig. 2F)........... ....*rudbeckiae* (Cockerell and Casad)

19. Mesopleural punctures little, if any, coarser than those of frons; transverse and oblique carinae usually absent; lateral face marks constricted above (Figs. 2A, G, I); smaller species, length to apex of second tergite, 2.7-3.5 mm 20
Mesopleural punctures much coarser than those of frons; transverse and oblique carinae present, distinct; lateral face marks not constricted above (Fig. 2B); larger species, length to apex of second tergite, 3.0-4.2 mm.. *stevensi* (Crawford)

20. Lateral face marks expanded above constriction, *or* continued upward and curving inward above antennal sockets (Figs. 2G, I)......................21
Lateral face marks not expanded above constriction, rarely extending beyond level of upper margin of antennal sockets, never curving inward above sockets (Fig. 2A)..*fedorica* (Cockerell)

21. Punctures of mesoscutum and mesoscutellum coarse, separated by one-half a puncture diameter or less, the interspaces densely tesselate, and dull; rugulae of basal area of propodeum usually extending to summit of declivity..22
Punctures of mesoscutum and mesoscutellum fine, mostly separated by one and one-half times a puncture diameter or more, interspaces lightly tesselated and moderately shiny; rugulae of basal area evanescent beyond middle, rarely attaining summit of declivity...............................23

22. Tibiae and tarsi entirely yellow; tegulae maculate; scape largely yellow beneath...*labiatifrons* (Cockerell)
Middle and hind tibiae yellow on basal-half only; tegulae often black; scape often entirely dark beneath...............................*cressoni* (Cockerell)

23. Apical lobes of ninth ventrite shorter than pedicle.................................. ....*cressoni mesillae* (Cockerell)
Apical lobes of ninth ventrite distinctly longer than pedicle.................... .... *sejunctus* Snelling

Hylaeus (*Hylaeus*) *verticalis* (Cresson), NEW STATUS

Figs. 1G, 2H, 3B, 5B

Prosopis verticalis Cresson, 1869. Proc. Boston Soc. Nat. Hist. 12:271. ♂.

Prosapis tridentulus Cockerell, 1896. Psyche 7 (sup.): 27. ♂ NEW SYNONYMY.

Prosapis tridens Cockerell, 1896. *Op. cit.*: 27. ♂.

Prosopis subtristis Swenk and Cockerell, 1910. Ent. News 21:70 ♀. NEW SYNONYMY.

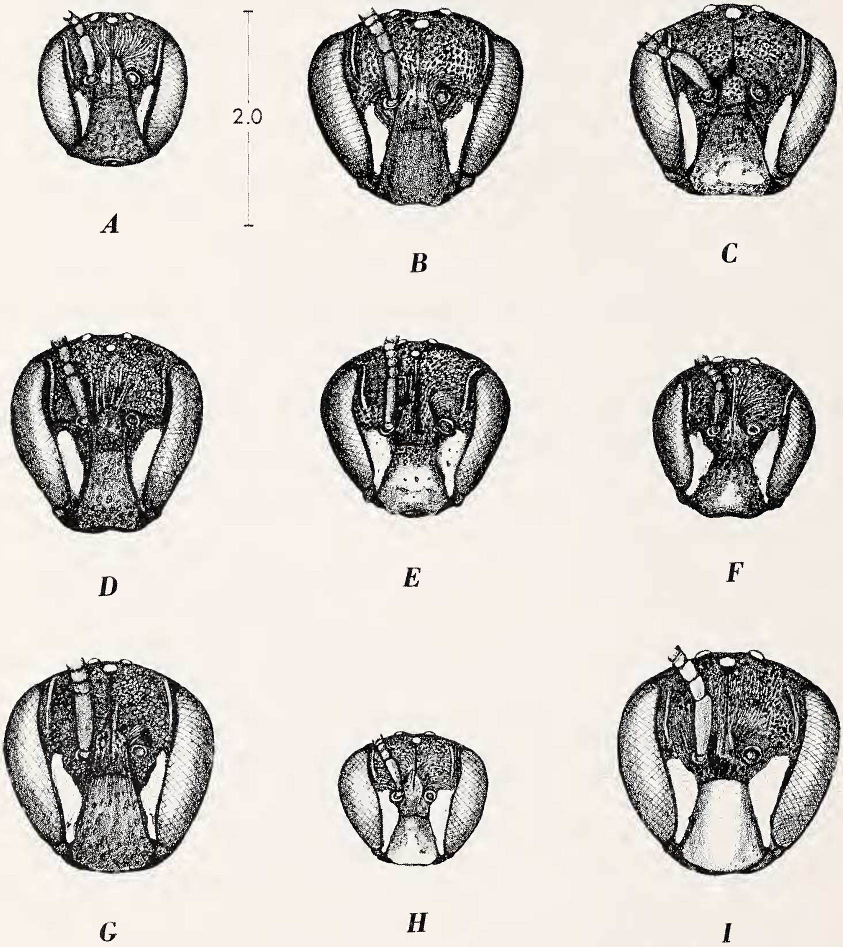

Figure 1. *Hylaeus* (*H.*) spp., female faces: A, *H. fedorica*; B, *H. stevensi*; C, *H. ellipticus*; D, *H. maritimus*; E, *H. rudbeckiae*; F, *H. cressoni cressoni*; G, *H. verticalis;* H, *H. sejunctus;* I, *H. conspicuus*. Figures by Ruth A. DeNicola.

Prosopis melitina Lovell, 1911. Ent. News 22:214. ♀.

Prosopis tridentulus, Metz, 1911. Trans. Amer., Ent. Soc. 37:116-117.

Prosopis episcopalis var. *subtristis*, Metz, 1911. *Op. cit.*: 131. ♀ (*in part*).

Hylaeus verticalis, Cockerell and Sumner, 1931. Amer. Mus. Nov. 490: 3-4.

Hylaeus verticalis tridentulus, Linsley, *In* Mueseback, *et al.*, 1951. U.S.D.A., Agr. Monog. No. 2:1050.

Hylaeus verticalis verticalis, Linsley, *Op. cit.*: 1052. Mitchell, 1960. N. C. Agr. Exp. Sta. Tech. Bul. 141:76.

With the exception of *H. cressoni* no species of *Hylaeus* is more widely distributed than *H. verticalis*. Throughout most of its range this species is quite common and highly variable. Most of the variation occurs in the females. This variation assumes several different forms. In western populations there is a strong tendency for the apical one-third of the clypeus to be suffused with reddish, rather than entirely black. This variant form is found together with females which have the clypeus entirely black, but there is a noticeable trend toward the maculate condition in those populations which occur at lower elevations in the Sierran and Cascade ranges, and it is a dominant feature in the populations of the Coast Ranges in California. The maculate clypeus is rare in northern and eastern populations. Very rarely are specimens found which have small yellow maculate on the pronotal collar. I have seen only three such specimens among the hundreds I have examined; all were females, one from Idaho, one from Colorado and one from California.

Variation, too, occurs in the shape of the pronotal collar. In the usual condition the pronotal collar, when viewed from above is very nearly as long in the middle as at the sides. In profile it is convex and evenly rounded toward the anterior pronotal neck. Some females, however, have the middle portion flat and somewhat compressed so that it is much shorter here than at the sides. Such specimens, on the basis of the material I have seen, occur only in the western populations, and are especially common in samples from Oregon, California and Nevada. No specimens presenting an intermediate condition are known to me, and these individuals may actually represent a cryptic sibling of *H. verticalis*. I have not, however, been able to associate them with any male variant, so am content to assign them to *H. verticalis* for the present.

I have examined the types of *H. tridentulus, H. tridens* and *H. subtristis* and can find no justification for their continued recognition. The first two, both based on males from Colorado, were named because of slight differences in the color of the maculae and slight differences in punctation from the typical form described from Pennsylvania. With large series of males from the entire range of the species available, it is evident that they fall well within the total range of variation exhibited by any one population. The females described by Swenk and Cockerell from Nebraska as *H. subtristis* are perfectly typical of the western populations of *H. verticalis*; they were merely the, until that time, undescribed opposite sex of this species. The females which Metz (1911) had called *H. episcopalis subtristis* were a conglomerate association which included, in addition to *H. verticalis, H. rugulosus rugulosus* (Cockerell), *H. r. episcopalis* (Cockerell) and *H. modestus citrinifrons* (Cockerell). I have not seen the type of *H. melitina*, but as there is nothing in its description to indicate merit for its further consideration, I have accepted its synonymy as published by Mitchell (1960).

Hylaeus (*Hylaeus*) *cressoni cressoni* (Cockerell)

Figures 1F; 2H; 6.

Prosopis pygmaea Cresson, 1869. Proc. Boston Soc. Nat. Hist. 12:272. ♂. *Preoccupied* by Schenck, 1853.

Prosopis cressoni Cockerell, 1907. Annals and Magazine of Natural History (7) 20:131. New name for *P. pygmaea* Cresson, not *P. pygmaea* Schenk. Metz, 1911. Trans. Amer. Ent. Soc., 37:105. ♂ ♀.

Prosopis pasadenae Cockerell, 1910. Annals and Magazine of Natural History (8) 5:30. ♂ ♀.

Prosopis teleporus Lovell, 1911. Ent. News, 22:213. ♀ ♂. NEW SYNONYMY.

Hylaeus mesillae race *pasadenae*, Meado-Waldo, 1923. *In* Wytsman, Gen. Insect., fasc. 181:30.

Hylaeus laciniatus Cockerell and Sumner, 1931. Amer. Mus. Novitates, 490:9-10. ♂. NEW SYNONYMY.

Hylaeus repolitus Cockerell and Sumner, 1931. *Op. cit.*, 13-14. ♀. NEW SYNONYMY.

Hylaeus (*Hylaeus*) *cressoni cressoni*, Linsley, 1951. *IN* Muesebeck, *et al.*, Hymen. Amer. N. Mex., Synoptic Cat., Monogr. 2, U.S.D.A., p. 1050; Mitchell, 1960, N. C. Agr. Expt. Sta. Tech. Bull. 141:60, 62, 70.

Hylaeus (*Hylaeus*) *cressoni pasadenae*, Linsley, 1951. *IN* Muesebeck, *et al.*, Hymen. Amer. N. Mex., Synoptic Cat., Monogr. 2, U.S.D.A., p. 1050.

Hylaeus (*Hylaeus*) *teleporus*, Linsley, 1951. *IN* Muesebeck, *et al.*, Hymen. Amer. N. Mex., Synoptic Cat., Monogr. 2, U.S.D.A., p. 1052; Mitchell, 1960, N. C. Agr. Expt. Sta. Tech. Bull. 141:60, 62, 75; fig. 11.

This species extends transcontinentally from southern Canada to northern Mexico. Over most of this range *H. cressoni* is a common species. The populations from eastern, northern and montane regions commonly have the clypeus and pronotal collars immaculate. Some individuals within these populations may also lack maculae on the pronotal lobes and the tegulae. Clinal variation occurs uniformly from east to west, from north to south and with decreasing elevation. This clinal variation is manifested in two concordant characters, an increase in the tone and extent of the pale maculae and a decrease in the size and density of metasomal punctation, so that populations at opposite poles of the cline are very different in appearance. Specimens from

Turlock, California, for example have the face marks bright yellowish, the apical portion of the clypeus is strongly infused with reddish color and the pronotal lobes and collar and the tegulae are conspicuously maculate. The abdomen is smooth and shiny, with few or no distinct punctures. Such specimens contrast sharply with others from the New England area in which the maculae are dull yellowish-white, the clypeus is black and the thorax completely immaculate; such specimens may have the metasomal tergites with obvious fine scattered punctures. The same is true if one compares the Turlock specimens with samples from Revelstoke, British Columbia, or with others from Sonora Pass in the Sierra Nevada of California. In all cases the two extremes are connected, through the intervening portions of the range, by a series of specimens of intermediate character. These series of intermediates form, in their entirety, a well-defined cline for the characters noted.

Under these cricumstances continued recognition of *H. pasadenae*, described from Pasadena, California, as a subspecies of *H. cressoni*, a status accorded this form in the past, is untenable. This bee does not possess any of the characteristics of a definable subspecies and I agree with Metz in placing *H. pasadenae* in the synonymy of *H. cressoni*. The subsequent continued recognition of *H. pasadenae* as a subspecies of *H. cressoni* seems to be traceable to Cockerell's refusal to accept the synonymy published by Metz. However persistent such a refusal has been, there appears to be no published indication why Metz's proposal should not be adopted.

Lovell's *H. teleporus* was proposed for *H. cressoni*-like males in which the lateral face marks terminate acutely at the level of the lower margin of the antennal sockets. These males seem to occur sporadically within the populations of *H. cressoni* in northern and montane areas. I have examined the terminalia of males of this form and find no distinctive characters which will serve to separate *H. teleporus* from *H. cressoni*. I believe that *H. teleporus* should be placed in the synonymy of *H. cressoni* until conclusive evidence for the specificity of this form can be advanced.

Cockerell and Sumner described *H. repolitus* from a single female taken at Ogden, Utah. Dr. Rozen sent the type to me and I find nothing in any of its characters to justify separating this bee from *H. cressoni*. The nearly smooth basal zone of the propodeum is exactly like that of many females of *H. cressoni* available to me which also show a strong reduction in the longitudinal rugulae of the basal zone. This characteristic cannot be correlated with other features nor is it geographically consistent.

Dr. Rozen has sent the type of *H. laciniatus*, and there is no doubt that this name, too, is a synonym of *H. cressoni cressoni*. Before I had the opportunity to study the type, I was puzzled by the peculiar shape fo the seventh ventrite as figured by Cockerell and Sumner (1930:10, fig. 2). With the type slide before me, it is clear that the apical lobes of this ventrite have been broken off. The poor preparation of the slide, on which everything is badly flattened and distorted, is also responsible for the seemingly expanded gonocoxites, as these were illustrated by Cockerell and Sumner.

Cockerell and Sumner cite the type as follows: "COLORADO—Boulder, May 24, 1913 (F. E. Lutz)." The labels on the specimens clearly read "Boulder, Colo., M. D. Ellis, May 24, 1913," and "*Salix*." Since the specimen and slides are in accord with the original description and figures, and the type is so marked in Cockerell's handwriting, I have no reason to doubt that this is the true type.

Hylaeus (*Hylaeus*) *cressoni mesillae* (Cockerell)

Figures 3C; 5C; 6.

Prosopis subtilis Cockerell, 1895. Trans. Amer. Ent. Soc., 22:295. ♀. Preoccupied by Förster, 1871.

Prosopis mesillae Cockerell, 1896. Canad. Ent., 28:42. new name for *P. subtilis* Cockerell, not *H. subtilis* Förster.

Prosopis magniclavis Swenk and Cockerell, 1910. Ent. News, 21:68. ♂ ♀. NEW SYNONYMY.

Prosopis cressoni, form *mesillae*, Metz, 1911. Trans. Amer. Ent. Soc., 37:107 (in part).

Hylaeus cressoni, var. *magniclavis*, Meade-Waldo, 1923. *IN* Wytsman, Gen. Insect., fasc. 181:30.

Hylaeus mesillae, Meade-Waldo, 1923. *Op. cit.* :30.

Hylaeus (*Hylaeus*) *magniclavis*. Linsley, 1951. *IN* Muesebeck, *et al.*, Hymen. Amer. N. Mex., Synoptic Cat., Monogr. 2, U.S.D.A., p. 1051.

Hylaeus (*Hylaeus*) *mesillae*, Linsley, 1951. *Op. cit.* :1051.

The status of *H. cressoni mesillae* has been confused. Proposed originally as a full species, it was reduced by Metz to status as a "form" of *H. cressoni*. Crawford, two years later, elevated the name to specific status based on differences in the shape of the eighth ventrite, and the bee has been recognized at this level since then. Unfortunately, while Crawford's conclusions were sound, they were based on misidentified specimens. I have examined the genitalia and associated ventrites of many males from New Mexico, Arizona, California and Sonora, Mexico. With the exception of the California specimens all exhibited characters typical of *H. cressoni*.

The California material, however, was represented by two very distinctly different types of terminalia. The first of these was typically *H. cressoni,* identical to those specimens from New Mexico and Arizona. The second type agreed closely with the figure published by Crawford under the name *H. mesillae*. Crawford dissected the terminalia from at least three males, which I have seen; all were from California. The type locality of *H. mesillae* is Mesilla, New Mexico, and the terminalia of males from this area are consistently of the *H. cressoni* type, and I am certain that the interpretation offered here is the correct one: that *H. mesillae* is conspecific with *H. cressoni,* and that Crawford's specimens represent another species, described below as new.

I have reduced *H. mesillae* to subspecific rank under *H. cressoni.* The females of this subspecies are a little smaller, on the average, than those of

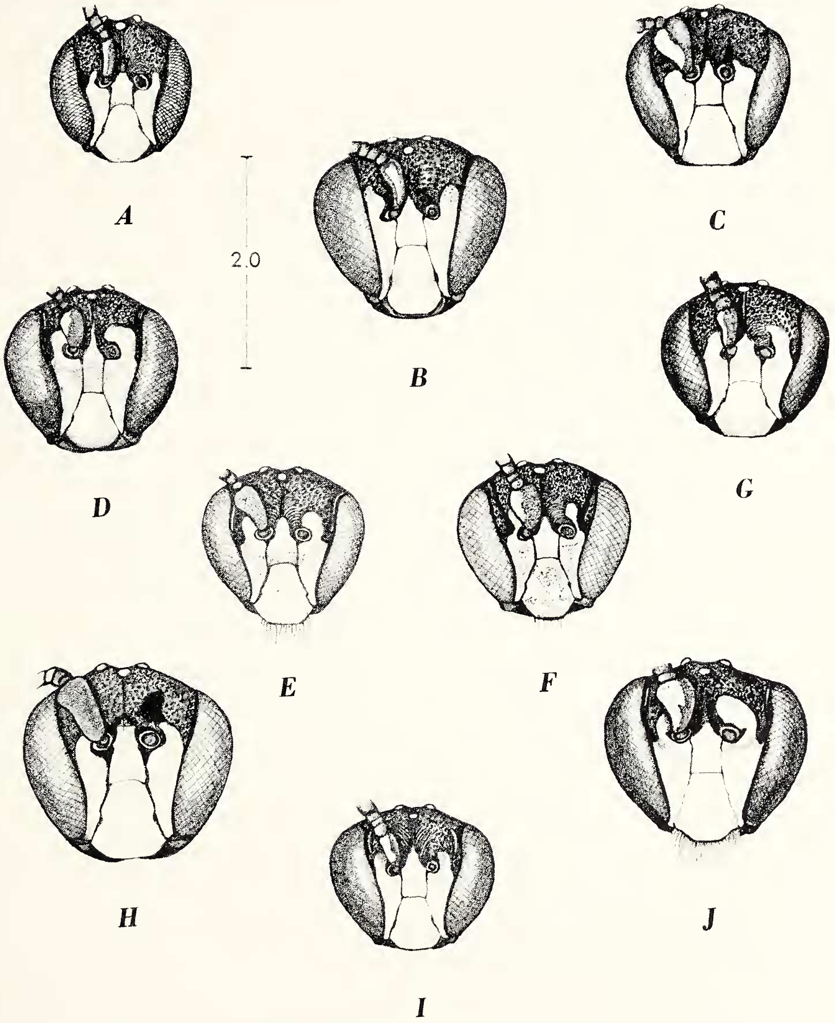

Figure 2. *Hylaeus* (*H.*) spp., male faces: A, *H. fedorica*; B, *H. stevensi*; C, *H. ellipticus*; D, *H. maritimus*; E, *H. granulatus*; F, *H. rudbeckiae*; G, *H. cressoni cressoni*; H, *H. verticalis*; I, *H. sejunctus*; J, *H. conspicuus*. Figures by Ruth A. DeNicola.

H. cressoni, and the integument of the body is less densely tesselate, hence more shiny. The punctation, too, differs, being distinctly finer and sparser on the mesoscutum and scutellum, as indicated in the key. Some western material, such as the synonymous form of *H. cressoni, H. pasadenae*, are as extensively maculate as *H. c. mesillae* but differ in that the maculae are bright yellow in these, while in *H. c. mesillae* they are whitish. These highly maculate specimens also possess large maculae on the pronotal collars, usually lacking in *H. c. mesillae*. When such maculae are present in the desert subspecies, they are small and inconspicuous.

Females from the desert areas commonly have the rugulae of the basal zone of the propodeum absent or restricted to the extreme anterior margin. In most material of *H. cressoni cressoni* the entire basal zone is distinctly longitudinally rugulose, except in some samples from Colorado and Utah. These appear to be intergrades between the two subspecies. This is somewhat puzzling, since such specimens do not seem to occur in other areas where the ranges of these two forms overlap.

Another intermediate form occurs in western Nebraska, eastern Wyoming and northeastern Colorado. This was described by Swenk and Cockerell as *H. magniclavis*. I have examined most of the type series of this bee and find no reason for its continued recognition. The males have the lateral face marks slightly expanded at their upper ends, but are otherwise similar to that sex of *H. c. mesillae*. I cannot find any differences to distinguish the females from those of *H. c. mesillae*. The male terminalia do not differ significantly from those of *H. c. cressoni* or *H. c. mesillae*, so there is no doubt that *H. magniclavis* is conspecific with these. Since the pale maculae and fine, sparse thoracic punctation are in accord with those characters in *H. c. mesillae*, I consider *H. magnicalvis* a synonym of this subspecies.

In figure 6 I have shown the results of a series of cephalic measurements which reflect differences between *H. c. cressoni* and *H. c. mesillae*. In 6A two phenomena are apparent. First that there are two concentration points on the basis of head width. There is some overlap, but the existence of two centers of concentration remains clear. A similar, but more obscure, pattern exists based on head length. These measurements of head length and head width are usefully converted into a Cephalic Index ($CI = \frac{HL}{HW} X\ 100$) which demonstrates their relationship as a ratio, figure 6B. A CI value of 100, of course, indicates HL and HW being equal, values lower than 100 indicate increasing relative width. The CI values of each form have been plotted in 4C as a frequency indication. From this figure it is obvious that while both forms most commonly possess CI values ranging from 91 to 100, a much higher percentage (25%) of *H. c. mesillae* have the head longer than broad than is true of the nominate form (9%).

The second noteworthy feature in figure 6A is the displacement of the

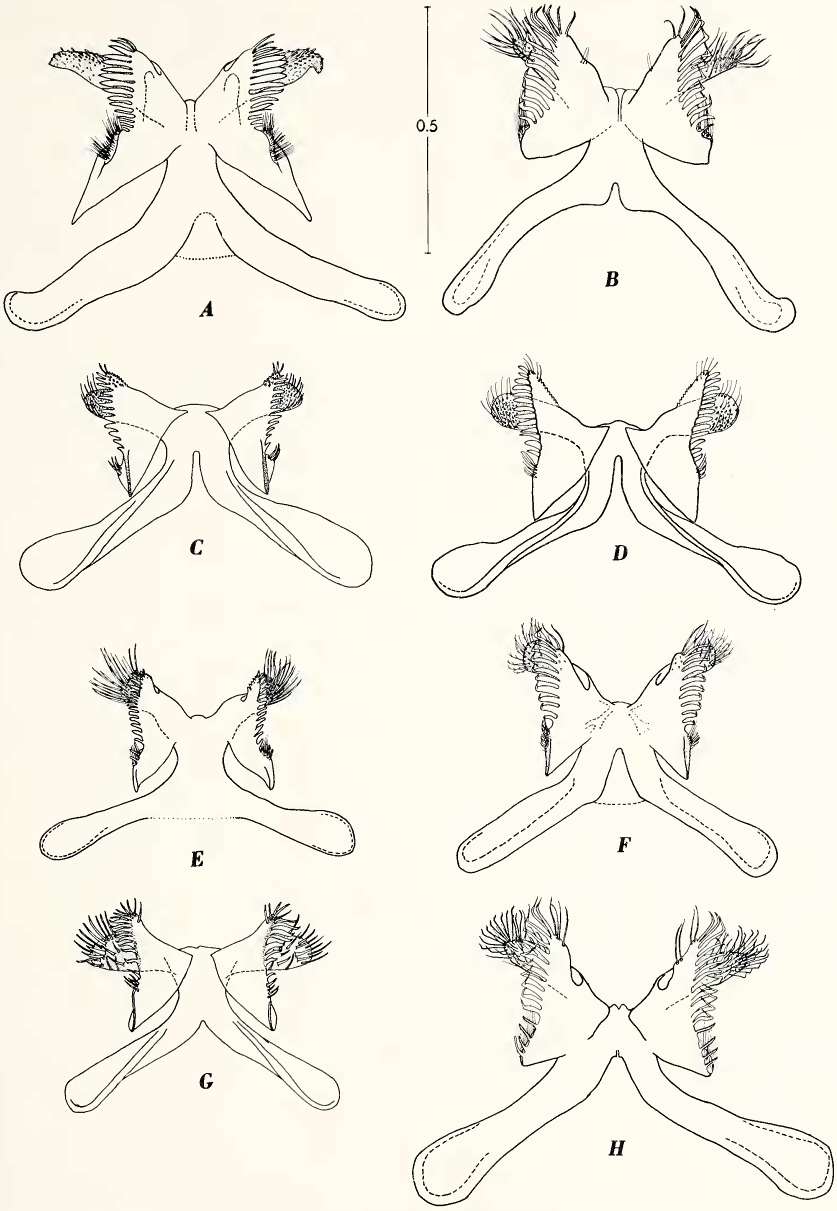

Figure 3. *Hylaeus* (*H.*) spp., ventrite VIII of males: A, *H. ellipticus*; B, *H. verticalis*; C,*H. cressoni mesillae;* D, *H. sejunctus;* E, *H. saniculae;* F, *H. fedorica;* G, *H. maritimus*; H, *H. stevensi*.

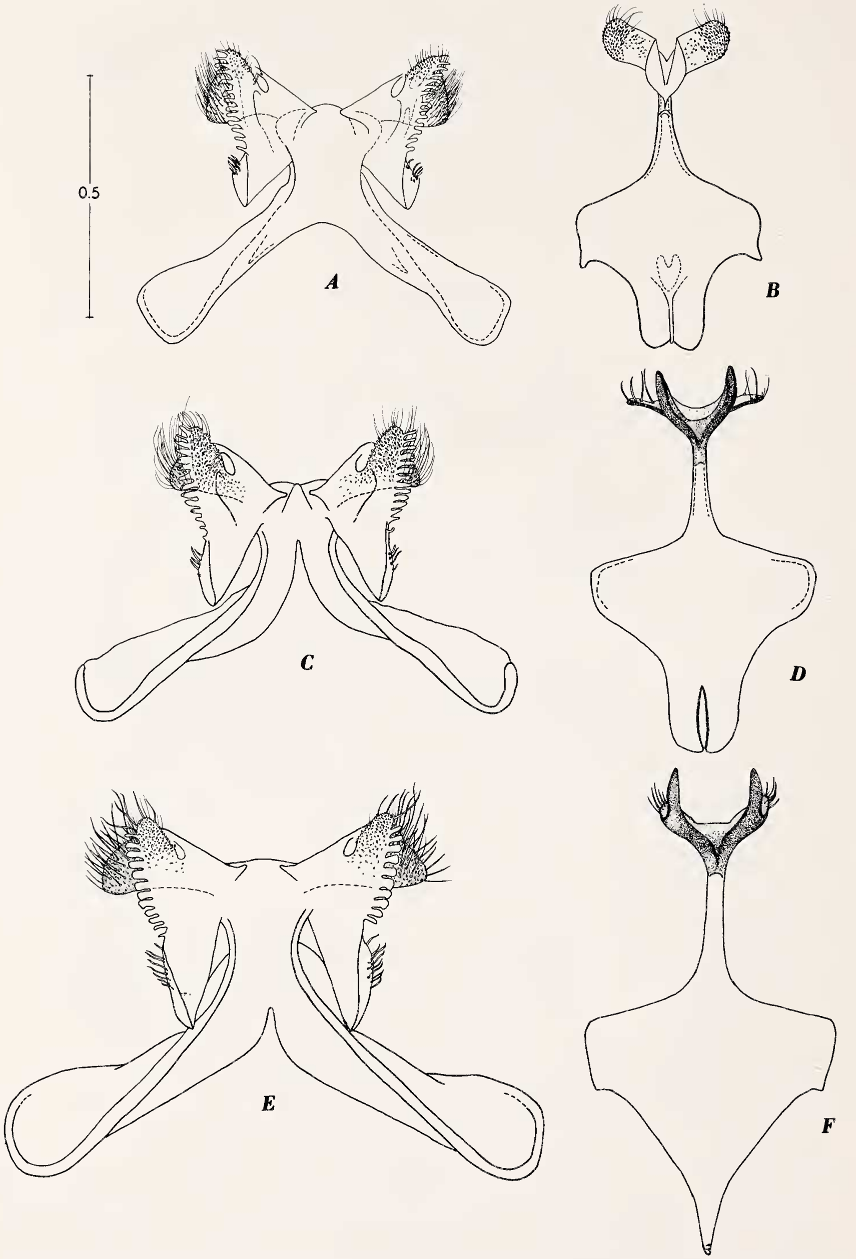

Figure 4. *Hylaeus* (*H.*) spp., ventrites VIII and IX, respectively, of males: A, D, *H. granulatus;* B, E, *H. rudbeckiae;* C, F, *H. conspicuus.*

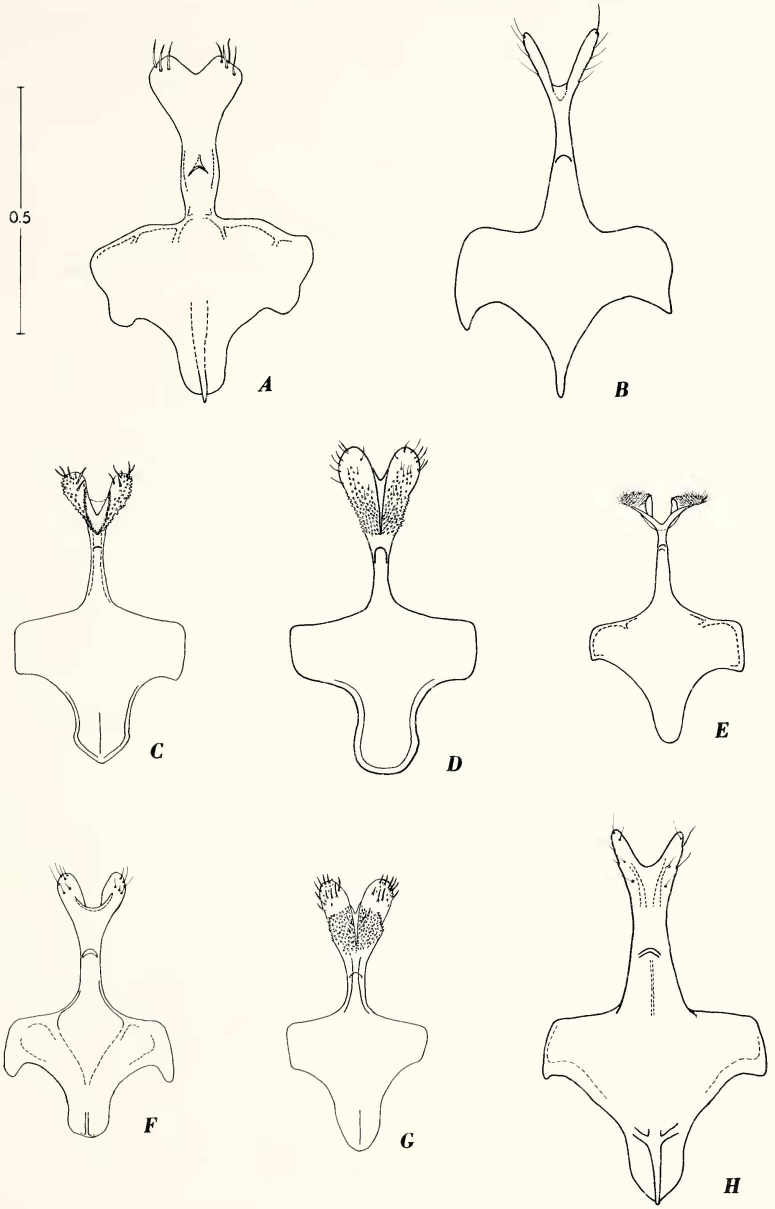

Figure 5. *Hylaeus* (*H.*) spp., ventrite IX of males: A, *H. ellipticus*; B, *H. verticalis*; C, *H. cressoni mesillae*; D, *H. sejunctus*; E, *H. saniculae*; F, *H. fedorica*; G, *H. maritimus*; H, *H. stevensi*.

skew-line of *H. c. mesillae* to a level below that of *H. c. cressoni.* There is also an apparent, though slight, reorientation of the skew-line angle to that of *H. c. cressoni.* These suggest that perhaps *H. c. mesillae* might be best regarded as a full species rather than as a subspecies. I am not inclined, at this time, to do so since specimens of an apparently intermediate nature do exist. These specimens come from those areas where they may be expected to occur if *H. c. mesillae* is truly a subspecies, *i.e.*, in the zones of sympatry. It is equally possible that these are hybrids of two incompletely separate species. However, since the male terminalia are, for practical purposes, so similar as to appear identical, I prefer to consider the desert form a subspecies of *H. cressoni.* This is also consistent with my treatment of other species.

This subspecies extends from western Nebraska, Kansas and Texas westward to Nevada, California and Baja California, Mexico. Southward it ranges into the Mexican States of Nuevo Leon, Coahuila, Chihuahua and Sonora. Populations in Colorado and Utah are largely sympatric with those of the nominate subspecies and hybridization occurs in these areas.

Hylaeus (*Hylaeus*) *sejunctus* Snelling, NEW SPECIES

Figures 1H; 2I; 3D; 5D.

Prosopis cressoni form *mesillae*, Metz, 1911, Trans. Amer. Ent. Soc. 37:107 (in part).

Prosopis mesillae, Crawford, 1913. Canad. Ent. 45:154-155. Not of Cockerell, 1896.

This is the species which Crawford called *P. mesillae* when he raised that name to specific level after Metz had reduced *mesillae* to a variety of *H. cressoni* (Cockerell).

Diagnosis: The male differs from that of *H. c. mesillae* in the less coarsely, closely punctate abdomen and in the shape of ventrite IX. The female differs in the much finer, sparser punctures of tergite II, the shorter, sparser pubescence of the abdomen, and the smaller size.

Male. Very similar structually to that of *H. c. mesillae* but differs in having the punctures of the mesoscutum finer, sparser, usually separated by a puncture diameter or more; punctures of tergite I very fine, separated by two or more times a puncture diameter; discal pubescence of tergite III shorter than that of mesoscutum; apical lobes of ventrite IX broad, as long as, or longer than, basal pedicle.

Female. Very similar structually to that of *H. c. mesillae* but differs as follows: punctures of median area of upper face of tergite I extremely fine, perceptible only under high magnification, very sparse; lateral areas of propodeum roughened, densely tesselate, with scattered, but distinct, punctures; erect discal pubescence of tergite III little, if any, more than two-thirds an ocellar diameter in length (a few widely scattered hairs may attain this length, but are outnumbered by shorter hairs).

Length, both sexes, to apex of tergite II, 3.2-3.7 mm.

Holotype male, allotype female (Los Angeles County Museum of Natural History), Winterhaven, Imperial Co., California, March 25, 1956 (R. R. Snelling), *Heliotropium curassavicum*.

Paratypes.—CALIF. *Imperial Co.*: 13 ♂ ♂, 10 ♀ ♀, same data as holotype (LACM); 1 ♀, 15.8 mi. NW Niland, April 11, 1963 (R. C. Dickson; UCR), on *Prosopis*; 1 ♂, 2 mi. S. Travertine Rock, March 29, 1936 (F. R. Platt; UCR), on *Prosopis*; 1 ♀, 5.2 mi. SE Kane Springs, April 15, 1949 (P. H. Timberlake; UCR), on *Tamarix gallica*; 1 ♂, 5 ♀ ♀, Coachella Canal, 20 mi. SE Hwy 195, April 2, 1960 (R. C. Dickson, P. H. Timberlake; UCR), on *Prosopis*; 2 ♀ ♀, U.S.D.A. Exp. Farm, May 31, 1912 (J. C. Bridwell; USNM); 1 ♂, 1 ♀, same locality, June, 1912 (J. C. Bridwell; USNM); 1 ♂, 1 ♀, El Centro, April, 1911 (J. C. Bridwell; USNM); 2 ♂ ♂, 1 ♀, Imperial Valley, April, 1911 (J. C. Bridwell; USNM). *San Diego Co.*: 1 ♂, 1 ♀, Borrego Valley, April 26, 1954 (J. G. Rozen; CIS); 1 ♂, Palm Cyn., Borrego Valley, March 29, 1936 (P. H. Timberlake; UCR), on *Prosopis*; 1 ♀, Borrego Valley, April 26, 1954 (M. Wasbauer; CIS); 1 ♀, same locality and collector, April 30, 1954 (CIS), on *Croton californica*; 11 ♂ ♂, 19 ♀ ♀, Coyote Cr., Borrego Valley, April 5, 1963 (F. D. Parker, R. M. Bohart, M. E. Irwin, A. Willink; UCD, IML); 2 ♂ ♂, Borrego Springs, April 2, 1960 (M. Wasbauer; CDA), on *Phacelia*; 2 ♂ ♂, Split Mt., Anza Desert State Park, April 1, 1955 (W. R. Richards; CNC); 1 ♀, Borrego Valley, April 20, 1961 (Rozen and Schrammel; AMNH), on *Prosopis*; 1 ♀, Borrego Valley, April 11, 1962 (R. M. Bohart; UCD). *Riverside Co.*: 10 ♂ ♂, 5 ♀ ♀, Andreas Cyn., March 26, 31, 1955 (W. R. M. Mason; CNC); 1 ♂, Willis Palms Oasis, April 9, 1955 (W. R. M. Mason; CNC); 2 ♂ ♂, Indio, March 30, 1955 (W. R. Richards; CNC); 1 ♀, Andreas Cyn., April 11, 1955 (W. R. M. Mason; CNC); 1 ♂, 1000 Palms Cyn., April 3, 1944 (P. H. Timberlake; UCR); on *Cryptantha barbigera*; 3 ♂ ♂, 5½ mi. NW Indio, April 9, 1936 (P. H. Timberlake; UCR), on *Prosopis*; 3 ♂ ♂, Andreas Cyn., April 2, 1955 (P. H. Timberlake; UCR), on *Hyptis emoryi*; 1 ♀, same locality and collector, April 11, 1936 (UCR), on *Prosopis*; 2 ♀ ♀, 1000 Palms Cyn., April 10, 1937 (P. H. Timberlake; UCR), on *Prosopis*; 1 ♀, 5 mi. W Indio, April 30, 1949 (E. G. Linsley, J. W. MacSwain, R. F. Smith; CIS), on *Melilotus*. *San Bernardino Co.*: 10 ♂ ♂, 7 ♀ ♀, Cronise Valley, April 29, 1956 (J. Powell, M. Wasbauer; CIS), on *Prosopis*; 5 ♂ ♂, 1 ♀, same locality, date, host (P. H. Timberlake; UCR), on *Salix*; 1 ♀, 29 Palms, April 13, 1935 (P. H. Timberlake; UCR), on *Isomeris arborea*; 7 ♂ ♂, 11 ♀ ♀, Needles, May 3, 1964 (P. Torchio & G. Bohart; USU), on *Tamarix* and *Prosopis*; 1 ♂, Needles, 20 mi. S., May 3, 1964 (P. Torchio & G. Bohart; USU). *Inyo Co.*: 1 ♂, Furnace Cr., Death Valley Natl. Mon., April 19, 1939 (E. G. Linsley; CIS), on *Prosopis*. NEVADA. 4 ♂ ♂, Searchlight, 30 mi. S., Clark Co., April 21, 1966 (Torchio, Rust, Yousef; USU). ARIZONA. 1 ♀, Yuma, 21 mi. N., Yuma Co., April 4, 1963 (A. Willink;

IML). MEXICO. 2 ♂ ♂, 2 ♀ ♀, Mexicali, 20 mi. W., Baja California del Norte, April, 1939 (C. D. Michener; CAS), on *Prosopis.*

Hylaeus (*Hylaeus*) *labiatifrons* (Cockerell)

Prosopis labiatifrons Cockerell, 1896. Psyche, 7 (suppl.): 437. ♂.

Prosopis cressoni, Metz, 1911. Trans. Amer. Ent. Soc., 37:105 (in part).

Hylaeus (*Hylaeus*) *labiatifrons,* Mitchell, 1960. No. Car. Agr. Exp. Sta. Tech. Bull. 141:62, 72. ♂.

The status of this form, described from a single male from Georgia, is enigmatical. It is known only from the unique type, which I have not examined. Metz (1911) considered it a synonym of *H. cressoni,* but Mitchell (1960) has elevated it to species level and briefly redescribed the type. Unfortunately, Mitchell's description contributes nothing new to permit the recognition of *H. labiatifrons.* In all features it seems to agree quite closely with males of *H. cressoni cressoni,* and seems to differ from that species only in the entirely yellow tibiae.

This difference seems to me to be of little value. Another Nearctic *Hylaeus, H. illinoisensis* (Robertson), is supposedly recognizable on the same basis. In that species, at least, males with entirely yellow tibiae are exceptional. Even those which have the tibiae wholly yellow show, under intense light, a slightly darker basal two-thirds which corresponds to the black basal area of most specimens. I suspect that the same is true in the case of *H. labiatifrons,* which I regard as a probable synonym of *H. cressoni cressoni.* The solution must wait until the type, especially ventrites eight and nine, can be examined and compared with those of the related species.

Hylaeus (*Hylaeus*) *fedorica* (Cockerell)

Figures 1A; 2A; 3F; 5F.

Prosopis digitata var. *fedorica* Cockerell, 1909. Ann. Mag. Nat. Hist. (ser. 8) 4:27. ♂.

Prosopis grossicornis Swenk and Cockerell, 1910. Entomol. News, 21:67. ♂. Metz, 1911. Trans. Amer. Ent. Soc., 37:118. NEW SYNONYMY.

Hylaeus (*Hylaeus*) *grossicornis,* Linsley, 1951. *IN* Muesebeck, *et al.,* U.S.D.A. Monogr. 2:1050; Mitchell, 1960. N. Car. Agr. Expt. Sta., Tech. Bull., 141:71-72.

I have examined the type of *Prosopis digitata* var. *fedorica,* now in the American Museum of Natural History, and have compared it with homotypes of *H. grossicornis* and there can be no doubt that these are conspecific, as first suspected by Metz (1911). The type locality of *H. fedorica* is Fedor, Lee County, Texas; *H. fedorica* has priority by one year over *H. grossicornis.*

This species ranges from Michigan to Minnesota, then southward to Texas; an eastern extension exists through the southern United States to North Carolina. The male may be readily distinguished by the characters

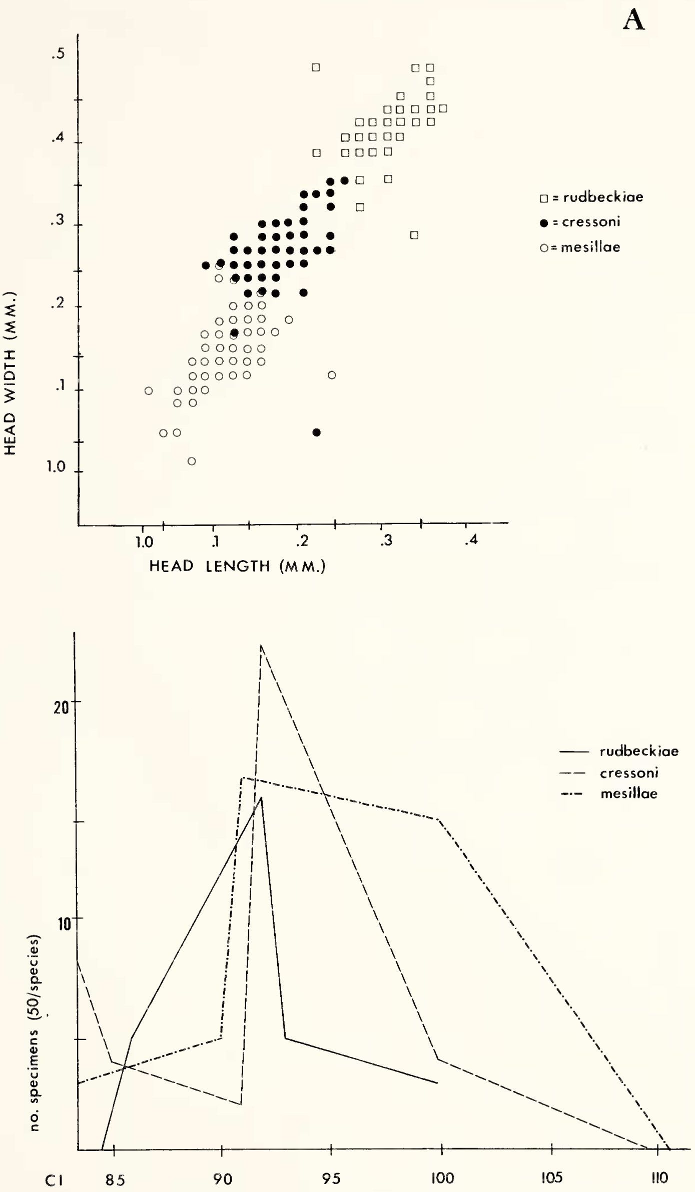

Figure 6. A, scatter diagram plotting Head Width and Head Length of *H. rudbeckiae* (squares), *H. cressoni cressoni* (solid circles) and *H. cressoni mesillae* (open circles); B, Cephalic Index frequency for *H. rudbeckiae* (solid line), *H. cressoni cressoni* (broken line) and *H. cressoni mesillae* (dot-dash line).

given in the key. The female, similar to that of *H. cressoni*, is best recognized by the shape of the head in full face view. In all other species of the *H. cressoni* group, the inner margins of the eyes are strongly divergent above, with the eyes rather strongly bulging. In these species the widest part of the head is somewhat above the level of the antennal sockets. In the female of *H. fedorica* the inner margins of the eyes are only slightly divergent above; the eyes are much less strongly bulging above and the widest part of the head is at, or below, the level of the antennal sockets. The head is always slightly longer than broad.

Hylaeus (*Hylaeus*) *saniculae* (Robertson)

Figures 3E; 5E.

Prosopis saniculae Robertson, 1896. Can. Entomol., 28:137. ♂ ♀.

Prosopis cressoni form *saniculae*, Metz, 1911. Trans. Amer. Ent. Soc., 37:106, 107. ♂ ♀.

Hylaeus (*Hylaeus*) *saniculae*, Linsley, 1951. *IN* Muesebeck, *et al.*, U.S.D.A. Monogr. 2:1052. Mitchell, 1960. N. Car. Agr. Expt. Sta. Tech. Bull., 141:73-74.

This rare species, largely northern in distribution, is very poorly known. In the United States it extends from Minnesota to the New England states and southward, through the Appalachian Mountains, to Tennessee and Georgia. In Canada it is known from Ontario and Nova Scotia. Although the male may be readily recognized by the peculiar oval depressions on the sides of the face, the female appears to be indistinguishable from that of *H. cressoni* except for its more restricted maculae. Attempts to characterize the female of *H. saniculae* are futile at this time because I have seen no females which I can confidently consider to be this species. Reared series, including both sexes, would be extremely useful in solving this problem.

Hylaeus (*Hylaeus*) *rudbeckiae* (Cockerell & Casad)

Figures 1E; 2F; 3B; E; 6.

Prosopis rudbeckiae Cockerell and Casad, 1895. Trans. Amer. Ent. Soc., 22:380. ♂; Metz, 1911. Trans. Amer. Ent. Soc., 37:111-114.

Prosapis bakeri Cockerell, 1896. Psyche, 7 (suppl.): 26. ♂.

Prosapis digitatus Cockerell, 1896. *Op. cit.*, 30. ♂.

Prosapis rudbeckiae ruidosensis Cockerell, 1896. *Op. cit.*, 30. ♂.

Prosapis rudbeckiae subdigitatus Cockerell, 1896. *Op. cit.*, 31. ♂.

Prosopis rudbeckiae form *digitatus*, Metz, 1911. Trans. Amer. Ent. Soc., 37:111, 112.

Prosopis rudbeckiae var. *bakeri*, Metz, 1911. *Op. cit.*, 111, 112.

Hylaeus rudbeckiae, Cockerell and Sumner, 1931. Amer. Mus. Novit., 490:7, 15.

Hylaeus (*H.*) *rudbeckiae,* Linsley, 1951. *IN* Muesebeck, *et al.*, U.S.D.A.

Monogr. 2:1052; Mitchell, 1960. N. Car. Agr. Expt. Sta. Tech. Bull., 141:73.

Although it is a simple matter to separate the males of this species from those of *H. cressoni*, I have found no reliable means to separate the females of the two species. There is a difference in the overall size of the females of these species which I have found most easily measured in terms of head width. However, the difference is a minute one and requires precise measurements. In figure 6A I have given the results of measurements of head width and head length of females of *H. rudbeckiae* compared with females of *H. cressoni* (represented by both subspecies). The range of head width is limited, varying from 1.31 mm to 1.50 mm, with the majority of the specimens having a head width in excess of 1.41 mm. In those specimens which have a head with less than 1.40 mm, the head length is 1.24 mm or more. In *H. cressoni* the total range of head width variation is much greater, extending from 1.12 mm to 1.37 mm. In those few specimens of *H. cressoni* which have a head width in excess of 1.34 mm the head length does not exceed 1.23 mm. These differences are slight but appear to be valid. They have been verified by checking against associated males and in reared series.

Figure 6B contrasts the cephalic index of *H. rudbeckiae* with that of the nominate form of *H. cressoni*. It may be noted that while both species most frequently possess a CI rating of 92, that is, with the head a little broader than long, a distinct tendency exists in *H. rudbeckiae* for the head to be broader still, and no specimens of this species seem to have a cephalic index over 100. While such high ratings are not common in *H. cressoni*, they do occur. In *H. rudbeckiae*, about 70% of the females examined had a cephalic index of 92 or less; in females of *H. cressoni*, only 33% have such a low rating.

In other morphological features the females are very similar and I have noted none that are sufficiently constant to be reliable. The two species are almost completely sympatric, *H. rudbeckiae* absent only from those areas inhabited by *H. c. mesillae*. In most areas *H. rudbeckiae* is slightly more brightly maculate, the maculae as a rule both more extensive and of a brighter, yellower tone. The integument of the mesoscutum and scutellum is more densely tesselate and less shiny.

Hylaeus (*Hylaeus*) *granulatus* (Metz)

Figures 2E; 4A; D.

Prosopis rudbeckiae var. *granulatus* Metz, 1911. Trans. Amer. Ent. Soc., 37:114. ♂.

Although this closely resembles *H. rudbeckiae*, it may be recognized by the features of the eighth and ninth ventrites (fig. 4A, D). External features do not appear to be reliable since both species are so variable. The following differences have been noted as tendencies which may be of value. The antennal and thoracic maculae of *H. granulatus* are less extensive than is usually true of *H. rudbeckiae*. In *H. granulatus* the scape may be black or with a small, basal spot on the lower margin; the pronotal collar may be immaculate or with a pair of minute yellowish spots at the extreme sides; the pronotal lobes are one-half, or more, black; the tegulae may be either black or with a small median spot. In *H. rudbeckiae* these areas are usually conspicuously maculate, except in specimens from northern or high altitude sites. The metanotum of both species is dull, but in *H. granulatus* it is rugosopunctate, while in *H. rudbeckiae* it has fine sparse rugulae and a few distinct scattered punctures. In *H. rudbeckiae* the basal zone of the propodeum is coarsely rugose, with the rugae in the median portion basically parallel. The basal zone of *H. granulatus* may be coarsely and irregularly rugulose, or with fine rugulae only on the anterior half, the posterior half appearing granulose.

The status of this form is enigmatical. Metz described it from three males from Ormsby County, Nevada. No type was ever designated and so I am selecting a specimen from the original series, collected by Baker in July, as the lectotype. This specimen has been deposited in the American Museum of Natural History. Since the time of its description this bee has never been regarded as anything other than a variety of *H. rudbeckiae*, of which it has been considered a synonym. Its status here as a species is provisional, pending the acquisition of more material. This form may ultimately prove to be a hybrid resulting from a cross between *H. rudbeckiae* and *H. cressoni*. The extremes in variation in the sculpturing of the basal zone of the propodeum are suggestive of *H. cressoni* and the details of the eighth and ninth ventrites are intermediate between *H. cressoni* and *H. rudbeckiae*. If *H. granulatus* is a valid species, its female is currently unknown, but probably will be extremely similar to that of *H. rudbeckiae*.

In addition to the three males from Nevada I have seen others from scattered localities in the Sierra Nevada of California, from Lassen County to Tulare County, and from the San Gabriel Mountains in Los Angeles County. I also have a few males from Colorado which seem referrable to this form; these differ slightly, however, in the shape of the ninth ventrite which is very similar to that of *H. cressoni*. In areas where these specimens were taken, both *H. cressoni* and *H. rudbeckiae* are common.

Hylaeus (*Hylaeus*) *maritimus* Bridwell

Figures 1D; 2D; 3G; 5G.

Hylaeus maritimus Bridwell, 1910. Proc. Haw. Ent. Soc. 4:159. ♀ ♂.

Hylaeus (*Hylaeus*) *maritimus*, Linsley, 1951. *IN* Musesebeck, *et al.*, U.S.D.A. Monogr. 2:1051.

This rare species appears to be largely restricted to the coastal sand dunes of central California. The two females taken by Timberlake at Mt. Pinos are the only exceptions, and it is difficult to explain the presence of *H. maritimus* in that area.

Both sexes of this species, which is closely related to *H. conspicuus*, may be readily recognized by the characters given in the key.

NEW RECORDS (all California): *Sonoma Co.*: 4 ♀ ♀, Wright's Beach, August 22, 1950 (J. Linsley; CIS), on *Eriogonum*. *Marin Co.*: 1 ♂, Pt. Reyes, April 11, 1959 (G. I. Stage; LACM); 9 ♂ ♂, 2 ♀ ♀, same locality, May 16, 1958 (D. D. Linsdale; CIS); 2 ♂ ♂, same locality and date (J. Powell; CIS); 1 ♀, same locality, May 15, 1937 (R. C. Dickson; UCR). *San Francisco Co.*: 1 ♂, San Francisco (Land's End), July, 1922 (F. X. Williams, UCR); 1 ♂, San Francisco, April 16, 1960 (G. I. Stage and R. R. Snelling; LACM); 1 ♂, San Francisco (Lobos Cr.), June 15, 1960 (G. I. Stage; GIS); 1 ♂, San Francisco (Lone Mtn.), July 4, 1920 (F. X. Williams; CAS); 1 ♂, 4 ♀ ♀, San Francisco (sand dunes), April 9 to August 22, 1926 (C. L. Fox; CAS); 1 ♀, Lake Merced, June 5, 1959 (T. R. Haig; UCD). *San Mateo Co.*: 1 ♂, Salada Beach, April 21, 1918 (E. P. Van Duzee; CAS). *Monterey Co.*: 1 ♂, Pacific Grove, July 3 (T. D. A. Cockerell; UCR); 5 ♂ ♂, 10 ♀ ♀, same locality, May 29, 31, 1954 (M. Wasbauer; CIS); 3 ♂ ♂, same locality, May 16, 1959 (G. I. Stage; GIS, LACM); 1 ♀, Carmel, July 21, 1923 (L. S. Slevin; CAS); 2 ♂ ♂, 2 ♀ ♀, Asilomar, May 10, 16, 1959 (D. J. Burdick; GIS, LACM); 1 ♀, Asilomar, 1 mi. S, May 17, 1959 (D. J. Burdick; LACM); 1 ♂, Asilomar, 2 mi. S, September 26, 1959 (C. W. O'Brien; LACM); 1 ♂, same locality, May 17, 1959 (G. I. Stage; GIS). *San Luis Obispo Co.*: 7 ♂ ♂, 9 ♀ ♀, Grover City, July 4, 1956 (E. G. Linsley, P. D. Hurd; CIS), "dunes Assoc." *Santa Barbara Co.*: 1 ♂, Refugio Cyn., July 4, 1959 (J. R. Russell: UCD). *Kern Co.*: 1 ♀, Mt. Pinos, August 17, 1935 (P. H. Timberlake; UCR), on *Hemizonia corymbosa* (var. *barclayi*); 1 ♀, same data, except, *Grindelia* (*robusta*) *platyphylla* (UCR).

Hylaeus (*Hylaeus*) *conspicuus* (Metz)

Figures 1I; 2J; 4C; F.

Prosopis conspicua Metz, 1911. Trans. Amer. Ent. Soc. 37:114. ♂ ♀.

Hylaeus conspicuus, Cockerell and Sumner, 1931. Amer. Mus. Nov. 490:9.

Cockerell and Sumner (1931) recorded a female from Jackson, Wyoming, July 15, 1920, presumably collected by F. E. Lutz. I have on hand two females collected at Jackson on July 13-17, 1920, presumably by Lutz. Although these authors were surprised at finding this species in Wyoming, it is a widely distributed species in the northwestern states. In addition to the considerable material from California, I have seen specimens of *H. conspicuus* from the following states: *Nevada* (Ormsby Co., Gardnerville, Sparks, Paradise V.; AMNH, USNM, UCD, *Oregon* (Medford, UCD), *Washington* (Pullman; UCD), UC, CAS), *Idaho* (Shoshone, Star, Murtaugh, Midvale, 5 mi. NE Mackay, Parma, Dixie, Boise, Moscow Mts., Sweet, Emery Can., Melba, 8 mi. N Twin Falls, 18 mi. S Moscow; UI), and *Wyoming* (Jackson; AMNH, CU).

Hylaeus (*Hylaeus*) *stevensi* (Crawford)

Figures 1; B; 2B; 3H; 5H.

Prosopis stevensi Crawford, 1913. Can. Ent., 45:155. ♂ ♀.

Hylaeus (*Hylaeus*) *stevensi*, Linsley, 1951. *IN* Muesbeck, *et al.*, U.S.D.A. Agr. Monogr. 2:1052. Mitchell, 1960. N. Car. Agr. Exp. Sta. Tech. Bul. 141:61, 62, 74-75; figs. 11, 12, 13, 14.

This species is not closely related to any other in the Nearctic fauna, but is very similar to the Palearctic *H. bisinuatus* Förster. The two are so closely related that I know of no reliable external feautres which will separate them. The male terminalia of the two are very similar to one another. More material must be studied, however, to determine whether they are conspecific or not.

This species has recently been introduced into Hawaii (Beardsley, 1959), and is evidently adventive in parts of its range where it is now quite common. I believe that this species has extended its range appreciably within the past 50 years. The earliest known capture of this species is in 1912 at Fargo, North Dakota; these specimens form the type series. The species has been collected in North Dakota on many occasions since then, but remained rare in *Hylaeus* samples taken until after 1925. After this date it became increasingly common, until it is now the species most frequently captured.

The earliest records outside of North Dakota are 1915 (Colorado) and 1916 (Alberta, Canada). Earliest records for other states, proceeding west from North Dakota to the Pacific coast, are: Wyoming and Idaho (1920), Utah (1922), British Columbia and Washington (1925) and California (1933). This species is found in eleven states east of the Mississippi River; the earliest date of capture which I have seen is 1927 in Massachusetts. In none of his numerous papers on eastern bees does Robertson mention this bee; this species is so distinctly different from the remaining eastern *Hylaeus* that he certainly would have recognized it as different from any previously described.

Within California the earliest record for this species is 1933 at Sacramento. There are few records in the 1930's and 1940's. But, beginning with 1950 there are abundant records, largely from the Central Valley area. My greatest field acquaintance with this species is in California, so the following observation must be considered with this point in mind. All of the California records are within, or on the periphery of, agricultural cultivated areas. I can affirm, further, that the bulk of my records from most of the area west of the Continental Divide come from similar situations, as nearly as I have been able to determine.

This bee is of further interest in that it alone of all the species of *Hylaeus*, s. str., exhibits a pronounced tendency toward oligolecty on flowers of the family Leguminosae. Of 87 specimens bearing floral data, 56 were taken on *Melilotus* species. These legumes are introduced from the Palearctic region. Of the remaining 31 records, 13 are from introduced Palearctic plants in other families (Amaranthaceae, Umbelliferae, Cruciferaceae, Tamaricaceae, Leguminosae) and eight of these are records of males. The remaining 18 records involve the families Polygonaceae, Asclepiadaccae, Salicaceae and Compositae, all belonging to genera represented in the Palearctic region: six of these records are of males.

The above data would seem to indicate the possibility that this species was introduced into the area around Fargo, North Dakota sometime prior to 1912. Once established there it began to extend its distribution both east and west and by 1925 apparently reached both coasts; subsequent distribution has been extended southward, so that this species now occurs in southern California, Oklahoma and Georgia. It is now a well-established part of our fauna and appears to be oligolectic on the legume genus *Melilotus*. If this is, in fact, an introduced species, it may well prove to be a synonym of a described Palearctic species. This, however, may not be decided for many years yet due to the extremely chaotic status of the taxonomy of European *Hylaeus*.

It is possible that this species is a native component which was, prior to the first quarter of the century, a very rare species. Subsequent to that time the increased abundance of a suitable food-source plant (the introduced genus *Melilotus*) and the conditions of an unbalanced ecology may have permitted this species first to thrive in its native region and then to spread out to other, similarly disturbed areas. Of numerous series of specimens reared from soda straw traps by A. R. Gittins in Idaho, many are referrable to *H. stevensi*. This species, then, is strongly apt to exploit artificial nesting possibilities, such as exist in and around farm buildings.

EXCLUDED SPECIES

In 1966 I included *H. gaigei* (Cockerell) in this subgenus largely on the conjectural statement of Mitchell (1960), who had seen the type, that it may prove to be the female of *H. rudbeckiae*. Since then I have examined the type, in the U.S. National Museum, and conclude that it was incorrectly associated by me with the subgenus *Hylaeus*. The type, a female, is a small, obscurely maculate individual. This species belongs to the subgenus *Prosopis* and may be a synonym of *H. modestus* Say.

PARAPROSOPIS

The subgenus *Paraprosopis* in America north of Mexico is exceeded in number of species only by the subgenus *Prosopis*. This group is largely western in distribution and seems to be centered in the southwest. Although Holarctic, few species extend into Canada, and none of these very far. Only one species may be considered truly boreal; species of *Paraprosopis* are most commonly encountered in the Transition and Sonoran zones.

This subgenus is a difficult one with which to work and this is particularly true of the females. The various species are very similar in appearance and structure and several of the most widely distributed species are quite variable.

Species groups are so poorly delimited that I see little point in attempting to define them except in very general terms.

The largest group is that of *H. wootoni* (Cockerell) which includes the following species: *H. coloradensis* (Cockerell), *H. cookii* (Metz), *H. floridanus* (Robertson) *H. lunicraterius*, n. sp., *H. nevadensis* (Cockerell), *H. personatellus* (Cockerell), *H. polifolii* (Cockerell) and *H. wootoni* (Cockerell). There is considerable variation within the group, but all the species are superficially very similar in the females. In these the first tergite is densely and distinctly punctate (excepting *H. floridanus*), the integument between the punctures usually smooth and somewhat shining, the transverse propodeal carina is absent (except in *H. cookii*), the lateral and oblique propodeal carinae often reduced or absent, the facial foveae ending one-third or less of the distance between the eyes and ocelli, the mesopleurae densely and closely punctate and the head as broad, or broader, than long. Although the clypeus is typically immaculate, some females of one species (*H. polifolii*) may possess a small preapical spot. The males are similar to their females except for the usual sexual differences.

Three groups include but a single species each. The *H. sonorensis* group contains only *H. sonorensis* Cockerell, a desert species recognizable by the head being longer than broad, the elongate pale macula on the female clypeus, the entire transverse macula on the pronotal collar and the extremely fine punctures of the second tergite. Another species in which the pronotal macula is entire is *H. asininus* (Cockerell and Casad), the sole member of the *H. asininus* group. In this group the facial foveae of the female end much nearer to the ocelli than the eyes, the transverse propodeal carina is present in both sexes, and the female mandibles are truncate apically. The only other species with an entire macula on the pronotal collar is *H. megalotis*. This unique member of the *H. megalotis* group may be easily separated from the other groups in the female by the elongate apical mandibular tooth, the absent or incomplete oblique propodeal carina and the broadly translucent apical margins of the first four tergites. The male differs from that of most others by the finely, sparsely punctate first tergite, the broadly translucent tergal margins and the longer flagellar segments.

All three of these groups, while apparently related to the *H. wootoni* group, seem not to be closely related to one another, although it is interesting that all occur in arid and semi-arid regions. Of the three, that of *H. sonorensis* seems farthest removed from the *H. wootoni* group as evidenced by the elongate face and the male apical sternites.

The last group, that of *H. calvus*, includes four species: *H. calvus* (Metz), *H. georgicus* (Cockerell) and *H. timberlakei*, n. sp., and the Palearctic species, *H. ater* Saunders. In these species the facial foveae of the female end closer to the ocelli than the eyes, the anterior coxae tend to be angulate or subspinose laterobasally, the mesopleurae are shining and finely, sparsely punctate, the female genae are broader than the eyes in profile, the female clypeus is usually distinctly maculate and the first tergite of the female is finely and sparsely punctate.

The females of several of the most common western species are very difficult to identify with certainty. The three most consistently difficult species are *H. coloradensis* (Cockerell), *H. polifolii* (Cockerell) and *H. wootoni* (Cockerell). Slight, but apparently consistent, differences in the shape of the eyes have been utilized. In the full frontal aspect the *Eye Length* (EL) is measured to the nearest tenth of a millimeter; the *Frontal Eye Width* (FEW) is measured across the eye to the inner margin at the level of the antennal sockets (fig. 10A). Similar measurements are made in lateral view. Here, however, *Lateral Eye Width* (LEW) is measured at its greatest point. Considerable use has been made of the presence or absence of the oblique propodeal carina as a supportive feature. This carina is best seen when the dorsal surface of the propodeum is viewed obliquely from above and cephalad of the propodeum.

The upper termination point of the facial foveae has also been frequently used in the key to the females. The position of termination is determined by viewing the top of the head from above. Measurement is made from the lateral ocellus to the nearest point of the inner eye margin and the position of the uppermost point of the fovea made on the basis of this line.

The method of determining the *Facial Width* (FW) used in previous papers on this genus (*i.e.*, the distance between the inner eye margins at the level of the antennal sockets) was found to be nearly useless within this subgenus. A different method for determining facial width has been used below. In full frontal view, the inner margins of the eyes are seen to be slightly sinuate at a point a little above the level of the antennal sockets, at the lower end of the foveae. This sinuation probably corresponds to the ocular sinuses of many wasps. The measurement for facial width is made at the center of the slight sinuation. The *Facial Length* (FL) is measured as in previous papers (*i.e.*, the distance from the anterior ocellus to the medio-apical clypeal margin). The *Upper Facial Distance* (UFD) is the maximal distance between the eye margins above, while the *Lower Facial Distance* (LFD) is the minimal distance between the eyes below. The *Clypeo-Ocular Distance* (COD) is measured from the laterobasal clypeal angle to the nearest point on the eye margin; the *Basal Clypeal Width* (BCW) is the maximal width of the clypeal base; the *Clypeo-Antennal Distance* (CAD) is measured from the laterobasal clypeal angle to the nearest point on the rim of the antennal sockets. The *Supraclypeal Quadrangel* (SCQ) is bounded below by the clypeal base, on the sides by the subantennal sutures and above by an imaginary line connecting the juncture of the subantennal sutures with the rims of the antennal sockets.

At several places in the key to the females reference has been made to punctures as being fine or coarse. The use of such poorly expressive terms has been relegated to the role of supportive features, since such vague expressions are both subjective and relative. Punctures which appear to be fine on one bee may appear *relatively* coarse on another bee of smaller size. In a rough way, punctures which I refer to as "coarse" are those which exceed 0.025 mm in diameter and are usually about 0.03 mm in diameter. Fine punctures are usually less than 0.02 mm in diameter. Such measurements are nearly without value, however, since the punctures of the mesopleura may vary as much as 50% in diameter measurements. Statements relative to puncture size are to be interpreted as referring to the largest punctures on the pertinent sclerite. Examination of females of several different species will soon permit one to adequately interpret the usage of such terms.

The figures of the eighth and ninth sternites of the males require some comment. The eighth sternite consists of a complex arrangement of four membranous lobes, conveniently termed the lateral (or basal) and apical lobes, basad of which are the apodemal arms. The orientation on the plates places the apical lobes uppermost and the apodemal arms below; this is the same arrangement used in preceding papers and will be used in all subsequent papers on this genus.

The lateral lobes of the eighth sternite are simple and usually possess a number of simple setae along their lower margins and at the apices. Sometimes the apical portion of this lobe folds back upon itself and consequently assumes a shape very different from that which is considered normal. The apical lobes are much more apt to present difficulties because the membrane is much more delicate and complex, hence subject to more pronounced distortion. These lobes may fold either along the inner margin or transversely at the middle. A well defined crease line is evident from the apex of the lateral arms to the outer margin and the transverse fold usually occurs at this point. Such folds will, of course, greatly alter the contour of the apical lobes and, because the membrane is so thin, this fact may easily pass unnoticed. An example is the figure by Metz (1911; pl. 5, fig. 60) of the eighth sternite of *H. cookii*; the distal half of the apical lobe has folded back upon itself, a fact unsuspected by Metz.

The ninth sternite is a much simpler structure; it is elongate and apically bifurcate. The apical lobes are thin and are partially sclerotized. The normal plane of these lobes is more or less vertical, so that a true illustration of this segment in a normal position would show two thin, apically divergent processes. However, since such a view would tend to conceal some characters of use taxonomically, the figures are traditionally based on slide mounted, and somewhat flattened, specimens in which the apical lobes are even more divergent than is normal and the plane is angularly distorted. The alternative to such a procedure is to prepare two figures, one of the true ventral aspect and one of the lateral aspect. I have here abided by the traditional method of figuring this segment largely in order than a common ground for comparison between my figures and similar figures by other authors may be established. Thus, when comparing these figures with specimens, important features to note are the width of the basal shaft, the relative length of the lobes and the number and arrangement of the plumose setae. The shape and degree of divergence of the apical lobes should be viewed with caution.

The key below includes all North American species described by previous authors, and recognized by me, as well as two new species described at this time. There exist a number of undescribed species from the western United States and Mexico but these are represented by too few specimens for me to wish to describe them at this time. If and when suitable series become available they will be described in a future part of this series, together with a new key.

KEY TO NEARCTIC SPECIES OF *PARAPROSOPIS*

1. Females; antennae twelve-segmented.. 2
   Males; antennae thirteen-segmented..15
2. Gaster without evident punctures, first tergite shining, polished; basal zone of propodeum as long as, or longer than, scutellum, much longer than metanotum; facial foveae ending much nearer ocelli than eyes .... *georgicus* (Cockerell)
   Gaster with distinct punctures, at least on first tergite, the tergite polished or not; basal zone of propodeum shorter than scutellum, little, if any, longer than metanotum; facial foveae variable.. 3
3. Apical mandibular tooth elongate, as long or longer than its basal width, extending much beyond the well-defined inner tooth, apex of mandible thus acute; oblique propodeal carina absent or incomplete; facial foveae ending slightly nearer ocelli than eyes; first tergite polished, shining, punctures fine, separated by a puncture diameter or more; apical margins of tergites 1-4 broadly translucent yellowish.. *megalotis* Swenk and Cockerell
   Apical mandibular tooth much shorter than basal width, hardly extending beyond the poorly defined inner tooth, apex of mandible thus truncate; oblique propodeal carina present or not; facial foveae variable; tergal surface variable; tergites usually without pallid apical margins 4
4. Facial length 1.4 times facial width, oblique propodeal carina absent, lateral carina absent or obsolescent; facial foveae ending near midpoint between eyes and ocelli; punctures of first tergite very fine, separated by about a puncture diameter; second to fifth tergites duller, densely micropunctate and with fine appressed pubescence; clypeus with longitudinal macula; pronotal collar with complete transverse macula .... *sonorensis* Cockerell
   Facial length 1.3 or less, times facial width; oblique and lateral propodeal carinae usually present; punctures of tergites variable, first tergite

frequently coarsely punctate; clypeus usually immaculate; pronotal collar usually with macula, when present, interrupted in middle............ 5

5. Outer margin of fore coxae abruptly produced near base, forming a triangular to subspinose process; facial foveae ending nearer ocelli than eyes; mesopleura distinctly shining, with well-separated fine punctures; first tergite finely, sparsely punctate; clypeus with longitudinal macula .... *calvus* (Metz)

Outer margin of fore coxae not abruptly produced near base; remaining characters without the above combination.. 6

6. Basal zone of propodeum abruptly declivious behind, with distinct transverse carina separating the more or less horizontal anterior face from the vertical posterior face; metanotum densely tesselate, with scattered distinct punctures; wings pale whitish, veins yellowish to light brown 7

Without above combination of characters.. 8

7. Smaller species, facial length not over 1.2 mm.; second tergite sharply, closely punctate; facial foveae ending nearer eyes than ocelli, or midway between; macula on pronotal collar interrupted in middle.............. .... *cookii* (Metz)

Larger species, facial length 1.3 mm. or more; second tergite with very fine obscure punctures or nearly impunctate; facial foveae ending nearer ocelli than eyes; macula on pronotal collar usually entire.................... ....*asininus* (Cockerell and Casad)

8. First tergite smooth, punctures extremely fine, sparse to scattered; second tergite without obvious discernible punctures; mesopleura dull to moderately shining, with fine punctures separated by a puncture diameter or more; metanotum dull, without evident punctures.............. ....*floridanus* (Robertson)

Without above combination of characters.. 9

9. Mesopleura moderately shining, with fine punctures separated by a puncture diameter or more; propodeal disc with coarse oblique rugae convergent toward mid-line, metanotum with coarse quadrate areolae at extreme base; clypeus with longitudinal median stripe *timberlakei* Snelling

Mesopleura dull to slightly shining, punctures variable, usually separated by about one-half a puncture diameter; propodeal disc usually without rugae, when rugae are present they are irregular; metanotum either not areolate basally or areolae extremely fine, appearing as a band of quadrate punctures; clypeus immaculate or with small preapical spot 10

10. Facial length 1.3 times facial width; oblique propodeal carina present, area above carina coarsely reticulate; transverse propodeal carina present...*lunicraterius* Snelling

Facial length no more than 1.2 times facial width; oblique propodeal carina present or absent, area above usually not coarsely reticulate; transverse propodeal carina usually absent..11

11. Small species, facial length not exceeding 1.2 mm., usually about 1.1 mm.; facial length 1.1 times facial width; facial foveae ending about one-third of distance between eyes and ocelli; oblique propodeal carina usually present and area above coarsely reticulate..*nevadensis* (Cockerell)
Larger species, facial length 1.3 mm. or more; facial length 1.2 times facial width; facial foveae ending about midway between eyes and ocelli; oblique propodeal carina and area above variable........................12

12. Metanotum flattened, densely tesselate, but with distinct punctures nearly as large as those of scutellum; scutellum distinctly flattened, shinier than mesoscutum, more finely punctate, the punctures separated by a puncture diameter or slightly more; lateral face marks reduced, frequently absent; erect hairs of mesoscutum sparse, short, less than half as long as those of scutellum................*personatellus* (Cockerell)
Metanotum at least slightly convex, roughened, without evident punctures; scutellum slightly convex, not much duller than mesoscutum, punctures dense, nearly as large as those of mesoscutum; lateral face marks usually filling most of area between eye and clypeus; erect hairs of mesoscutum variable..13

13. Larger species, head width 1.6 mm. or more; oblique propodeal carina evanescent or absent; lateral propodeal carina usually evanescent above; clypeus always immaculate; EL 4.5-4.6 X FEW..*coloradensis* (Cockerell)
Smaller species, head width 1.5 mm. or less; oblique and lateral propodeal carina variable, but often present; clypeus often maculate; EL 3.3-4.5 X FEW 14

14. Oblique propodeal carina often absent, sometimes present but evanescent; clypeus immaculate...*wootoni* (Cockerell)
Oblique propodeal carina usually present and complete; clypeus often with preapical spot in middle....................................*polifolii* (Cockerell)

15. Basal zone of propodeum twice as long as metanotum, as long or longer than scutellum; first tergite microtesselate, impunctate or with very fine scattered punctures; scape 1.2-1.3 times longer than greatest width ....*georgicus* (Cockerell)
Basal zone of propodeum usually less than twice as long as metanotum, usually much shorter than scutellum; first tergite polished or tesselate, as a rule with abundant punctures, scape variable................................16

16. Head slightly longer than wide; FL 0.97 times HW, 1.17-1.20 times EL, 1.46-1.50 times UFW; oblique propodeal carina absent, lateral carina absent or evanescent; pronotal collar frequently with complete stripe; scape half as broad as long..............................*sonorensis* Cockerell
Head no longer than broad, usually broader than long; remaining characters not in above combination..17

17. Eyes rather strongly converging below, UFW at least 1.85 x LFW........18
Eyes less strongly convergent below, UFW no more than 1.80 x LFW, usually 1.75 or less..21

18. First two tergites with sparse, fine punctures, surface shining, with strong bluish iridescence; FL 2.6, or more, times LFW..........................
....*floridanus* (Robertson)
First two tergites with coarse, distinct punctures mostly separated by a puncture diameter or less, surface variable, but never with bluish iridescence; FL 2.5, or less, times LFW..19

19. Transverse propodeal carina absent, oblique carina poorly developed, basal zone narrowly rounded onto declivious face; second submarginal cell on marginal cell longer than adjacent portion of first submarginal cell; FL no more than 2.3 x LFW................................*polifolii* (Cockerell)
Transverse and oblique propodeal carinae well-developed, basal zone abruptly declivious behind transverse carina; second submarginal cell on marginal cell shorter than adjacent portion of first submarginal cell; FL at least 2.50 x LFW..20

20. Smaller species, HW not exceeding 1.0 mm.; basal, horizontal portion of propodeum nearly twice as long as metanotum, little shorter than scutellum ....*cookii* (Metz)
Larger species HW 1.28 mm. or more; basal, horizontal portion of propodeum little, if any, longer than metanotum, about half as long as scutellum...*asininus* (Cockerell and Casad)

21. First tergite finely, sparsely punctate, the punctures often obscured by dense tesselation 22
First tergite coarsely, closely punctate, surface usually shining, punctures always clearly defined...23

22. First tergite densely tesselate, rather dull, the punctures very obscure; lateral face marks ending abruptly at level of upper margin of antennal sockets (fig. 8K) *or* narrowly extended along inner orbits; labrum black or with median macula; flagellar segments beyond second slightly longer than broad..*calvus* (Metz)
First tergite shining, the punctures distinct; lateral face marks slightly expanded above, and ending well above level of upper margin of antennal sockets (fig. 9F); labrum wholly yellowish; flagellar segment beyond second at least as broad as long ..*megalotis* (Swenk and Cockerell)

23. COD 0.85 x BCW; supraclypeal quadrangle distinctly wider than long; lateral face marks short, ending at or below upper margin of antennal sockets; supraclypeal area usually immaculate, but sometimes with an obscure, irregular macula.......................................*nevadensis* (Cockerell)
COD at least equal to BCW; supraclypeal quadrangle often as long as wide; lateral face marks usually ending well above level of upper margin of antennal sockets; supraclypeal area usually with a large, quadrate

macula 24

24. COD 1.45 x BCW or less; HW less than 1.2 mm.; BCW 1.20-1.25 x CAD ....*wootoni* (Cockerell)
COD : : BCW variable; HW more than 1.3 mm.; BCW : : CAD variable 25

25. BCW less than CAD; COD more than BCW; sides of face usually strongly depressed below (fig. 8F).......................*coloradensis* (Cockerell)
BCW equal to or exceeding CAD; COD = BCW; sides of face never depressed below...26

26. CAD more than BCW; supraclypeal mark always present distinctly quadrate; lateral face marks narrowed toward inner eye margin (fig. 8J) ....*timberlakei* Snelling
CAD = BCW; supraclypeal mark often reduced or absent; lateral face marks ending broadly above (fig. 8I)........................*lunicraterius* Snelling

Hylaeus (*Paraprosopis*) *wootoni* (Cockerell)

Figures 7A; 8A; 10B; 11E.

Prosapis wootoni Cockerell, 1896. Psyche 7 (sup.): 26. ♂.

Prosapis divergens Cockerell, 1896. *Op. cit.*: 29. ♂. NEW SYNONYM.

Prosopis wootoni, Metz, 1911. Tarns. Amer. Ent. Soc. 37:144.

Prosopis cookii Metz, 1911. Trans. Amer. Ent. Soc. 37:139-141. ♀, not ♂.

Hylaeus wootoni, Cockerell and Sumner. Amer. Mus. Nov. 490:6.

Hylaeus divergens, Cockerell and Sumner. *Op. cit.*: 7-8.

Hylaeus perparvus Cockerell and Sumner, 1931. *Op. cit.*: 10-12. ♂. NEW SYNONYM.

This is one of the more widely distributed species of the subgenus *Paraprosopis*. Throughout its range it varies considerably in both size and structure; one of these variants was named by Cockerell (*H. divergens*). Metz reduced the name to the synonymy of *H. wootoni*, but twenty years later Cockerell and Sumner resurrected it on the basis of supposed genitalic differences as well as a slight difference in the shape of the lateral face marks. These claimed differences will not hold up when one considers the range of variation in a long series of specimens from many localities. Thus, one finds specimens with the genitalic characters of *H. wootoni* and the face marks of *H. divergens*, and vice verse. Furthermore, these varying combinations are usually found to occur together in a single area. The differences noted are therefore considered merely to be due to variation in the range exhibited by a single species, *H. wootoni*. Unless there are other, more stable, characters which I have not discovered, there seems to be no reason for the continued recognition of *H. divergens*.

I have examined the types of *H. cookii*, which are in the collection of

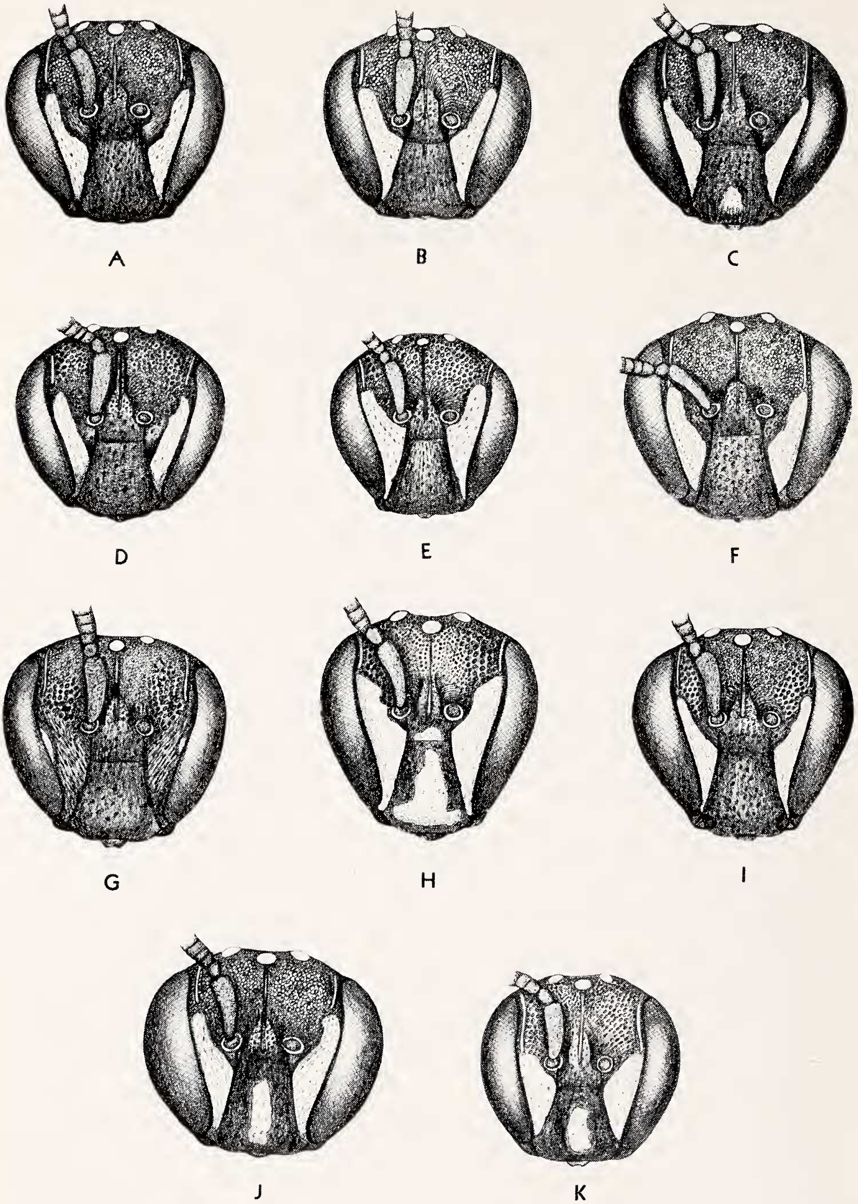

Figure 7. *Hylaeus* (*Paraprosopis*) spp., female faces: A, *H. wootoni*; B, *H. floridanus*; C, *H. polifolii*; D, *H. nevadensis*; E, *H. cookii*; F, *H. coloradensis*; G, *H. personatellus*; H, *H. sonorensis*; I, *H. lunicraterius*; J, *H. timberlakei*; K, *H. calvus*. Figures by Ruth A. DeNicola.

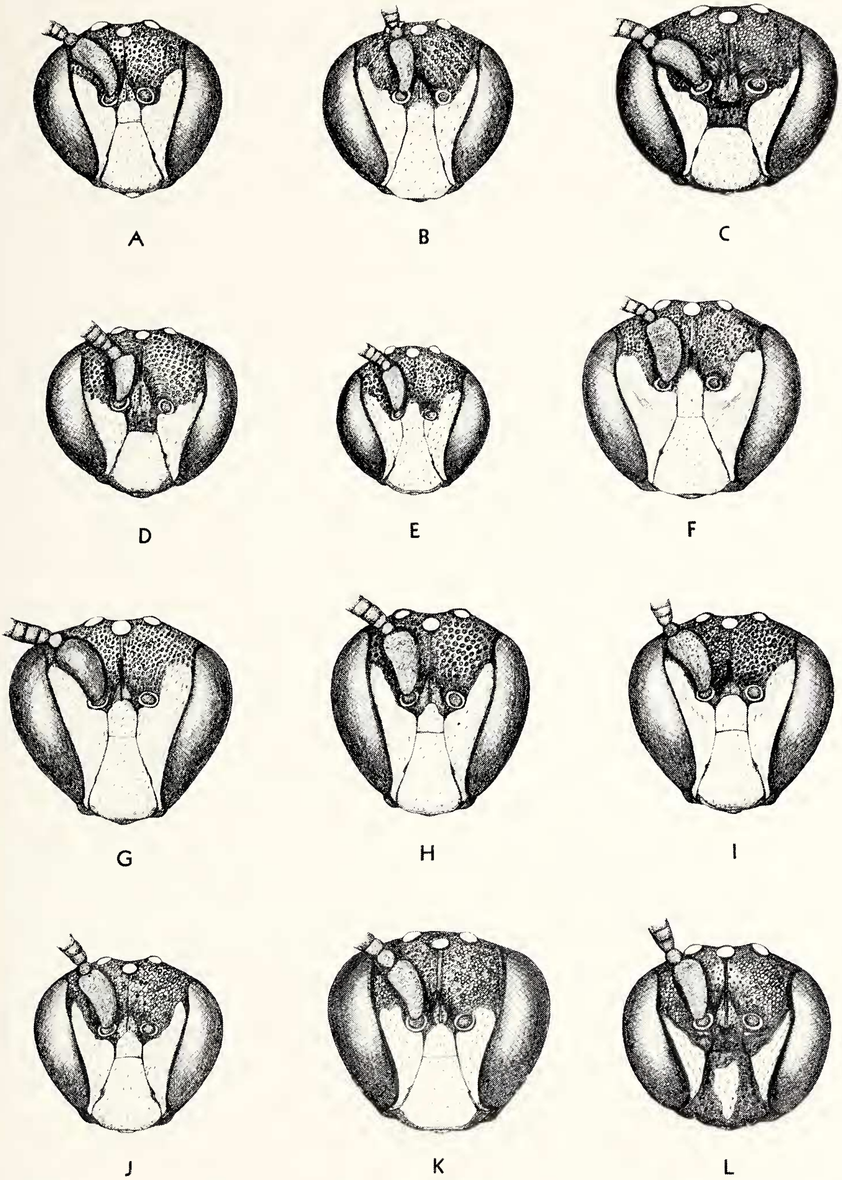

Figure 8. *Hylaeus* (*Paraprosopis*) spp., male faces: A, *H. wootoni*; B, *H. floridanus*; C, *H. polifolii*; D, *H. nevadensis*; E, *H. cookii*; F, *H. coloradensis*; G, *H. personatellus*; H, *H. sonorensis*; I, *H. lunicraterius*; J, *H. timberlakei*; K, *H. calvus*; L, *H. polifolii,* melanic form. Figures by Ruth A. DeNicola.

P. H. Timberlake, and find that the female allotype cannot be separated from that sex of *H. wootoni*, although the type male represents a valid species (see below).

The holotype male of *H. perparvus* Cockerell and Sumner has been examined. This specimen is a typical male of *H. wootoni*. The supposed differences in the genitalia are due to distortion which resulted from extreme flattening during the preparation of the slide. The distal portions of the lateral wings of the eighth ventrite are curled upward on the mount; this segment is at the edge of the balsam and difficult to see clearly. The ninth ventrite falls well within the range of variation attributed to *H. wootoni*.

Specimens have been examined from the following localities: *UNITED STATES. Nebraska* (Monroe Can. in Sioux Co.; UN), *Colorado, New Mexico, Arizona, Utah* (Emigration Can. and Big Cottonwood Can. in Salt Lake Co., Ogden; UCD), *Nevada, California, Oregon* (Tumalo Res. and Sisters in Deschutes Co.; UCD, CIS), *Idaho* (Craters of the Moon, Moscow Mts., Starkey, Ahsahke, 8 mi. E., Whitebird, 7 mi. N., Rock Cr., 12 mi. S., in Twin Falls Co., Twin Spr., 2.5 mi. W., Emery Can. in Cassia Co.; UCD, UI), *Wyoming* (Little Goose Can. near Sheridan; AMNH, CU). *MEXICO. Chihuahua* (Madera, San Jose de Babicora; AMNH). *CANADA. British Columbia* (Revelstoke; CU).

Hylaeus (*Paraprosopis*) *floridanus* (Robertson)

Figures 7B; 8B; 10C; 11F.

Prosopis floridanus Robertson, 1893. Trans. Amer. Ent. Soc., 20:273. ♀.

Prosopis eulophi Robertson, 1905. Canad. Ent., 37:236. ♀ ♂.

Prosopis modestus, Metz, 1911. Trans. Amer. Ent. Soc., 37:121. (*in part*)

Hylaeus (*Paraprosopis*) *packardi* Mitchell, 1951. Jour. E. Mitchell Sci. Soc., 67:244. ♂; Mitchell, 1960. N. Car. Agr. Exp. Sta. Tech. Bul., 141:62, 77. NEW SYNONYMY.

Hylaeus (*Paraprosopis*) *floridanus*, Mitchell, 1960. *Op. cit.*, 61, 62, 77-78; figs. 11, 12, 14. ♂ ♀.

I have examined the paratype of *H. packardi* and find that, aside from the immaculate pronotal collar and tegulae, it does not differ sufficiently from *H. floridanus* to justify specific status. Since such maculations are highly variable within this subgenus I do not feel that this form can be considered a subspecies either. While I have seen no other specimens with the immaculate pronotal collar, I have seen some with the tegular spot absent; it is commonly greatly reduced.

This species is so far known from the eastern United States, from Maine to Florida. A westward extension occurs along the Great Lakes as far as Minnesota.

Hylaeus (*Paraprosopis*) *nevadensis* (Cockerell)

Figures 7D; 8D; 10D; 11H.

Prosapis nevadensis Cockerell, 1896. Psyche 7 (sup.): 32. ♂.

Prosopis nevadensis, Metz, 1911. Trans. Amer. Ent. Soc. 37:148.

Hylaeus oregonensis Bridwell, 1919. Proc. Haw. Ent. Soc. 4:160-161. ♂ ♀. NEW SYNONYMY.

Bridwell based *H. oregonensis* on the lack of hairs on the eighth ventrite of the male, which he stated was like that of *H. calvus* (Metz). I have examined the holotype specimen, which is in the United States National Museum, and the paratype male. An examination of the eighth ventrites of these specimens convinces me that there is no justification for continued recognition of this form. The presence or absence of hairs on this segment appears to be a variable feature in *H. nevadensis* and I have seen many degrees of expression in specimens from widely scattered areas. In all other features *H. oregonensis* agrees with material of a more typical nature. The paratype female is inseparable from *H. nevadensis.*

This species occurs at moderate elevations in *California, Nevada, Oregon* (Mt. Jefferson, Grayback Camp in Josephine Co., Union Cr. in Jackson Co.; USNM, UCD), *Washington* (Seattle; UC), *Idaho* (Troy, Craters of the Moon, Whitebird, 7 mi. N., Athol, Granite, Nampa; UCD, UI), and *British Columbia* (Lilleoet, Robson, Summerland; CU, CNC).

Hylaeus (*Paraprosopis*) *coloradensis* (Cockerell)

Figures 7F; 8F; 10F; 11J.

Prosapis coloradensis Cockerell, 1896. Psyche 7 (sup.): 7. ♂.

Prosopis coloradensis, Metz, 1911. Trans. Amer. Ent. Soc. 37:141. ♂ ♀.

Hylaeus coloradensis, Cockerell and Sumner, 1931. Amer. Mus. Nov. 490:6. ♀ (*in part*).

Specimens examined are from the following states and Canadian provinces: *UNITED STATES. Wyoming* (Yellowstone Natl. Park; AMNH), *Colorado, Utah, New Mexico, Arizona, Nevada, California, Idaho* (Whitebird, 7 mi. N., Leadore; UI), *Washington* (Mt. Constitution, Pullman, Colfax; CAS, UC). *CANADA. British Columbia* (Revelstoke; CU).

Hylaeus (*Paraprosopis*) *personatellus* (Cockerell)

Figures 7G; 8G; 10I; 11K.

Prosopis personatella Cockerell, 1915. Annals and Magazine of Natural History (ser. 8) 16:485. ♀.

This species was described from a single female from Corona, Colorado, a locality which I have been unable to locate. Cockerell remarked, however, that the collection was made above timber-line which suggests a high altitude. The species has remained virtually unknown since that time although (Linsley, 1951) added California to the distribution. During this study I have seen few specimens which I can assign to this species, the type of which I have examined at the U.S. National Museum.

The females which I assign to this species all agree more or less closely with Cockerell's original description and with the type. The lateral face marks are commonly absent; when present they are greatly reduced, restricted to an irregular stripe or blotch along the lower inner orbits. Since females of other species of *Paraprosopis* taken in the same area frequently also have reduced face marks, this character alone is of little value. The pronotal collar seems always to be immaculate; the pronotal lobes and tegulae are maculate or not. As a rule, only the hind tibiae have a yellow basal spot, although some have such a mark on the fore tibiae.

The females most closely resemble those of *H. coloradensis*, to which this species appears to be related. They may be separated from that species by the distinctly flattened scutellum which is distinctly more shining than the mesoscutum and with fine, well-separated punctures. The metanotum, too, is flattened. As in *H. coloradensis*, it is dull and densely tesselate, but has distinct, well-separated punctures about equal to those of the scutellum. Females from areas where this species occurs together with *H. coloradensis* differ from that species also in having the erect hairs of the mesoscutum very sparse and short, so that they are hardly distinguishable from the reclinate hairs. These erect hairs are much shorter, usually no more than one-third as long, than those of the scutellum. In the sympatric females of *H. coloradensis* the erect mesoscutal hairs are abundant, and are usually as long, or nearly so, as those of the scutellum.

The presumed male of this species is similar to that of *H. coloradensis* but the sides of the face are not depressed as in that species. There are tangible differences in head shape as may be seen upon comparing figures 8F and 8G. Although the eyes are apparently more strongly convergent below in *H. personatellus* this is not actually the case, as the ratios are very nearly identical in the two species. The greater eye length of *H. personatellus* may be used as a convenient factor. In this species the eye is 3.4 times its greatest width but twice as long as the lower interorbital distance. In *H. coloradensis* the eye is 3.8 times longer than its greatest width, but only about 1.7 times longer than the lower interorbital width. The few males of *H. personatellus* which I have seen are all more densely pubescent on the thoracic dorsum than is true of *H. coloradensis*. The difference, however, is a matter of degree, and I do not attribute much significance to this character. Otherwise, the males are very similar externally and no reliable differences between them have been discovered.

In addition to the type I have seen the following additional specimens: COLORADO. 1 ♀, Ouray, 7500-8000′, 1-15 July 1897 (H. F. Wickham; LACM). CALIFORNIA. 1 ♀, Strawberry Valley, El Dorado Co., 16 Aug. 1912 (E. C. Van Dyke; CAS); 1 ♀, Sonora Pass, Tuolumne Co., 4 Aug. 1948

(P. D. Hurd & J. W. MacSwain; CIS); 1 ♀, Blue Canyon, Sonora Pass, Tuolumne Co., 10 Aug. 1960 (J. W. MacSwain; CIS); 1 ♀, same locality, 30 Aug. 1960 (P. D. Hurd; CIS); 9 ♂ ♂, Tioga Pass, 7 mi. E., Mono Co., 15 July 1961 (H. V. Daly, G. I. Stage; CIS); 1 ♂, Tom's Place, 1 mi. W., Mono Co., 13 Aug. 1957 (D. D. Linsdale; CIS), on *Eriogonum elatum*; 4 ♂ ♂, 1 ♀, near Mono Pass, 12,000′, Inyo Co., 15 Aug. 1957 (C. D. MacNeill; CAS); 5 ♀ ♀, Mono Pass, Inyo Co., 13 Aug. 1957 (J. Powell, D. D. Linsdale; CIS), one on *Pentstemon newberryi.*

Hylaeus (*Paraprosopis*) *polifolii* (Cockerell)

Figures 7C; 8C; 8L; 10G; 11G.

Prosopis polifolii Cockerell, 1901. Canad. Ent., 33:281. ♂. Metz, 1911. Trans. Amer. Ent. Soc., 37:146-148.

Hylaeus polifolii catalinensis Cockerell, 1938. Annals and Magazine of Natural History, ser. 11, 2:150. ♂ ♀. NEW SYNONYMY.

This common California species is closely related to *H. wootoni* and females are apt to be very difficult to separate in the absence of males. The two species are largely allopatric with overlaps occurring only in some areas of southern California and along the western portions of the Sierra Nevada. Females of *H. polifolii* which possess the preapical clypeal macula are easily recognized; I have never seen specimens of *H. wootoni* so maculated. The population of *H. polifolii* present on Santa Catalina Island, Los Angeles Co., Calif., was given a varietal name by Cockerell; in the females of this population, the clypeal macula seems always to be present. Populations from mainland California may or may not have a maculate clypeus, but this feature is subject to much variation within a given sample and is, moreover, not correlated with distribution. I see nothing to be gained by recognition of this insular form and have synonymized it under the nominate form.

The facial maculae of the males, too, are subject to considerable variation. In what I consider to be the basic or "typical" pattern, the clypeus is entirely yellow, the supraclypeal area is black, and the lateral face marks terminate above at a point about equal to a socket diameter above the antennal sockets. One variant form, very rare, exhibits an obscure maculation of variable size on the supraclypeal area. In the second variant form, which is fairly common, the clypeus becomes darkened along the lateral margins; this infuscation frequently encroaches so extensively onto the clypeus that the maculation is reduced to an erect median stripe.

Hylaeus (*Paraprosopis*) *cookii* (Metz)

Figures 7E; 8E; 10E; 11I.

Prosopis cookii Metz, 1910. Trans. Amer. Ent. Soc. 37:139-141. ♂, not ♀.

As indicated above, the female assigned by Metz to this species is *H.*

wootoni; the male type, now in the collection of the University of California at Riverside, is from Filmore Canyon, New Mexico, collected on Aug. 27 by T. D. A. Cockerell. Another male, with identical data is in the collections of the Los Angeles County Museum.

Until the present study was undertaken *H. cookii* was known only from the type. It is doubtful if this species could have been recognized from the original description, or the figures of the genitalia and hidden ventrites as illustrated by Metz. When I was able to examine the type, I found it to be identical with a species which P. H. Timberlake and I had independently assumed to be undescribed. Because of the inadequacies of the original description, the species is redescribed and the hidden ventrites illustrated.

Diagnosis.—Male: Small species, head width not exceeding 1 mm.; scape less than half as wide as long; lateral face marks ending well above level of antennal sockets; frontal punctures coarse, distinct; mesoscutal punctures distinctly finer than those of frons; punctures of tergite I as coarse as those of mesoscutum, those of tergite II finer, dense on both segments. Female: Small, head width not exceeding 1.3 mm.; frontal punctures coarse, distinct; mesoscutal punctures equal to those of frons; metanotum not rugulose, with distinct punctures; abdominal punctation similar to that of male, but punctures finer, tergite III distinctly, though finely, punctate.

Male.—Integument black, except the following pale creamy-white: clypeus; supraclypeal mark; lateral face marks, ending acutely on eye margin well above level of antennal sockets; medially interrupted stripe on pronotal collar; pronotal lobe; spot on anterior half of tegula; small apical spot on all femora; stripe on anterior tibiae; elongate basal and small apical spots on middle and hind tibiae; basitarsal and mediotarsal segments. Apical tarsal segments light ferruginous; tibial spurs whitish. Wings whitish-hyaline, veins and stigma light ferruginous. Erect pubescence whitish.

Head: UFD 0.76 x FL; LFD 0.52 x UFD; OCD 1.06-1.21 x TFD; basal width of clypeus 0.77 x distance from laterobasal angle to eye margin; distance between antennal sockets about equal to a socket diameter, distance from sockets to eye margin about 0.85 x a socket diameter. Maximum scape width about 0.42 x maximum length; minimum length of first flagellar segment about one-half length of second. Maculate portions of face slightly shining, finely punctate, those of clypeus separated by one-half to a full puncture diameter, those of lateral part of face somewhat elongate, linearly arranged, spacing variable; frons coarsely, contiguously punctate, the punctures distinct, the frons somewhat bulging on either side of midline. Vertex sharply raised above tops of eyes, coarsely punctate, the punctures crowded and less sharply defined than on frons.

Thorax: Mesoscutum dull, closely coarsely punctate, the punctures slightly larger than those of frons, separated by one-third to one-half a puncture diameter; mesoscutellum slightly shining, punctures about equal to those of mesoscutum, separated by one-half to a full puncture diameter; metanotum dull, densely tesselate, with punctures finer than those of mesoscutum, separated by about a puncture diameter; mesopleurae dull, tesselate, punctures about equal to those of mesoscutum, separated by about one-third to one-half a puncture diameter. Basal area of propodeum areolate; lateral areas coarsely punctate, the punctures poorly defined; transverse carina poorly developed, oblique carina absent; disc densely tesselate, with coarse punctures.

Abdomen: Tergite I shining, smooth, densely punctate, the punctures smaller than those of mesoscutum, separated by one-half to a full puncture diameter; tergite II more finely closely punctate, apical one-third (approximately), depressed, with scattered micropunctures, apical margin slightly reflexed; tergite III more finely, sparsely punctate; apical ventrites as illustrated.

Length, to apex of second tergite, 3.0-3.4 mm.; of forewings, 2.45-2.9 mm.

Female.—Similar to male in essential features, except as follows: clypeus and supraclypeal area dark, lateral face marks more rounded above; UFD 0.72-0.80 x FL; LFD 0.55-0.61 x UFD; OCD 1.02-1.07 x TFD; basal width of clypeus equal to distance from laterobasal angle to eye margin; distance between antennal sockets about 1.5 x a socket diameter; distance from sockets to eye margin slightly exceeding a socket diameter.

Length, to apex of second tergite, 4.0-4.3 mm.; of forewings, 3.2-3.5 mm.

New records.—*Arizona*: 1 ♀, Rincon Mtn., IX-16-1937 (E. D. Ball); 11 ♂ ♂, Stockton Peak, Pinaleño Mts., V-20-1954 (F. Werner), on *Fallugia*; 6 ♀ ♀, Madera Can., Sta. Rita Mts., IX-28-1956 (F. Werner), swept from *Aplopappus* and *Eriogonum*; 2 ♂ ♂, Sta. Catalina Mts., V-15-1955 (G. D. Butler); 1 ♀, Ramsey Can., Huachuca Mts., IX-8-1955 (F. G. Werner and G. D. Butler), on *Petalostemum candidum*; 1 ♀, west slope Patagonia Mts., V-21-1955 (G. D. Butler), on *Prosopis*; 3 ♂ ♂, 15 ♀ ♀, same locality, IX-7-1955 (G. D. Butler and F. G. Werner; all UA), on *Erigeron canadensis*; 7 ♀ ♀, Sycamore Can., Santa Cruz Co., IX-7, 8-1961 (G. I. Stage); 5 ♀ ♀, Southwest Research Station, IX-3, 4-1959 (G. I. Stage; all LACM); 1 ♂, same locality, V-14-1956, 1 ♀, same locality, VI-14-1956, 1 ♀, same locality, VII-19-1956 (all M. Statham); 6 ♀ ♀, Paradise, 4 mi. W., IX-9-1950 (W. Gertsch and M. Cazier; all AMNH); 1 ♀, 7 mi. W. Onion Saddle, Chiricahua Mts., Cochise Co., IV-10-1954, on *Haplopappus gracilis*; 2 ♀ ♀, Cave Cr., 5400 ft., Chiricahua Mts., Cochise Co., IX-8-1958, on *Solidago*; 4 ♀ ♀, Prescott, VI-27-1932, on *Asclepias tuberosa*; 1 ♂, 5 ♀ ♀, same locality, VIII-30-1930, on *Eriogonum*; 1 ♂, 1 ♀, same locality and host, VII-31-1930 (all P. H. Timberlake; all UCR); 1 ♂, Painted Desert, Apache Co., VIII-18-1958 (G. I. Stage; UCR), on *Eriogonum aureum*. *Nevada*: 1 ♂, Eastgate, 1 mi. W., Churchill Co., VIII-11-1958 (E. G. Linsley; CIS), at honeydew on *Chrysothamnus* sp. *California*: 12 ♂ ♂, 2 ♀ ♀, Paradise Camp, Mono Co., V-7-1960 (A. E. Menke; UCD); 1 ♂, 1 ♀, same locality and date (F. D. Parker; UCD); 1 ♂, Cottonwood Spr., Riverside Co., IV-12-1950 (W. F. Barr; UI); 10 ♂♂, Apple Valley, San Bernardino Co., V-10, 12-1955 (W. R. M. Mason; CNC); 5 ♂♂, 3 ♀♀, Ivanpah, 12 mi. SE., San Bernardino Co., V-1-1956 (M. Wasbauer); 1 ♂, same data, on *Salvia*; 1 ♂, same locality and date (B. J. Adelson), on *Salvia*; 4 ♂♂, same locality and date (P. D. Hurd; all CIS), 2 on *Sphaeralcea*; 2 ♂♂, same locality and date, on *Rhus trilobata*; 1 ♂, same locality and date, on *Salvia vitosa*; 2 ♀♀, same locality and date, on *Sphaeralcea ambigua*; 1 ♂, 3 ♀♀, Cactus Flat, 6000 ft., San Bernardino Mts., IX-1-1936, on *Chrysothamnus stenophyllus*; 1 ♀, Morongo Valley, San Bernardino Co., IX-29-1944, on *Eriogonum plumatella*; 3 ♀♀, same locality, X-5-1934, on *Gutierrezia lucida*; 1 ♀, same locality, X-14-1934, on *G. lucida*; 2 ♀♀, Yucca Valley, San Bernardino Co., IX-28-1944, on *G. lucida*; 1 ♀, same locality and host, IX-30-1944; 1 ♀, Mt. Home Cr., San Bernardino Mts., 5000 ft., VIII-14-1934, on *Phacelia ramosissima*; 2 ♀♀, Andreas Cyn., Riverside Co., X-27-1934, on *Solidago californica*; 1 ♀, Piñon Flat, San Jacinto Mts., VI-4-1934, on *Nolina perryi*; 1 ♀, same data except, on *Eriogonum fasciculatum*; 1 ♂, Whitewater, Riverside Co., IV-22-1928, on *E. fasciculatum*; 7 ♀♀, Whitewater Cyn., Riverside Co., X-14-1951, on *Lepidospartum*; 8 ♀♀, Lone Pine Cyn., 6000 ft., San Gabriel Mts., VII-21-1936, on *Tetradymia canescens*; 1 ♀, same locality and date, on *E. fasciculatum*; 1 ♂, Surprise Cyn., Panamint Mts., Inyo Co., IV-25-1957 (all P. H. Timberlake; all UCR), on *Eriogonum inflatum*.

Hylaeus (*Paraprosopis*) *sonorensis* Cockerell

Figures 7H; 8H; 10K; 11L.

Hylaeus sonorensis Cockerell, 1924. Proc. Calif. Acad. Sci. (4) 12:530-531. ♀.

Hylaeus sonorensis var. *melanorhinus* Cockerell, 1924. *Op. cit.* :531. ♀. NEW SYNONYMY.

Diagnosis: Although the superficial appearance of this species is quite similar to that of *H. asininus* (Cockerell & Casad), the shape of ventrites VIII and IX of the male ally it to *H. wootoni* (Cockerell). Both sexes differ from *H. asininus* in the more elongate face, denser and finer thoracic punctures and microscopic punctures of tergite II. From *H. wootoni* this species differs in the longer, narrower face, more finely punctate abdomen and more extensive maculae.

Male.—Integument black, except the following pale creamy-white; elongate spot at base of mandibles; labrum, clypeus; elongate supraclypeal mark; paraocular areas and along inner orbits, ending acutely on level midway between anterior ocellus and antennal sockets; entire transverse stripe on pronotal collar; pronotal tubercules; anterior half of tegulae; apical spot on all femora; entire fore tibiae except irregular blotch on inner surface; basal half of middle tibiae; basal three-fifths of hind tibiae; all basitarsi and first hind mediotarsal segment. Underside of flagellum yellowish-ferruginous. Medio- and distitarsal segments brownish; wings clear hyaline, veins and stigma brownish. Pubescence all pale whitish, on abdomen suberect and obscure.

Head: UFD 0.64-0.65 x FL; LFD 0.59-0.60 x UFD; OCD 1.19-1.21 x TFD; clypeus distinctly narrower basally than distance from latero-basal angle to eye margin; distance between antennal sockets less than socket diameter, distance from sockets to eye margins equal to socket diameter; clypeus, supraclypeal area and maculate facial area dull, densely tesselate, with scattered obscure punctures; nonmaculate areas with large, subcontiguous punctures, the densely tesselate interstices slightly shining; genae shining, punctures small, separated; minimum length of first flagellar segment about one-half length of second.

Thorax: Outer margin of fore coxae slightly convex; mesopleural punctures about equal to those of frons, mostly separated by about one-half a puncture diameter, the tesselate interstices more shining than frons; mesoscutal punctures equal to those of frons, subcontiguous, interstices slightly shining; mesoscutellar punctures larger than mesoscutal, spacing variable, but denser medially; metanotum not at all shining, very densely tesselate, with a few, coarse, deep punctures. Basal area of propodeum with a few irregular striae, the lateral ones transverse; latero-basal area roughened, shining, impunctate; lateral area slightly shining, with coarse, close punctures; oblique carina absent; lateral carina feebly developed, absent above lower half of disc.

Abdomen: Tergite I micro-tesselate, slightly shining, with fine punctures mostly separated by about a puncture diameter; tergite II more distinctly tesselate, punctures very fine, obscure, separated by about a puncture diameter; remaining tergites tesselate, slightly shining, with a few, scattered, obscure punctures; ventrites VIII and IX as in figures 10K and 11L.

Measurements: Body length (front of vertex to apex of second tergite), 3.5 to 3.8 mm.; forewing length, 2.9 to 3.1 mm.

Female.—Similar to male in sculpture and color, except as follows: mandibles and labrum entirely dark; clypeus with ⊥-shaped macula; supraclypeal area with small irregular mark; lateral face marks more rounded above; facial foveae ending about one-third of distance between eyes and lateral ocelli; UFD 0.69-0.70 x FL; LFD 0.68-0.70 x UFD; OCD 0.94-0.96 x TFD; distance between latero-basal clypeal angle and inner eye margin 0.75 times basal width of clypeus; distance between antennal sockets equal to a socket diameter and to distance between sockets and eyes. Fore basitarsus concolorous with medio- and distitarsi, hind basitarsus dark at apex. Punctures of tergite I a little finer and more separated than in male.

Measurements: Body length (front of vertex to apex of second tergite), 4.5 to 4.7 mm.; forewing length, 3.4 to 3.7 mm.

Both forms of *H. sonorensis* were described by Cockerell from single females from Guaymas, Sonora, Mexico; I have examined the types of both at the California Academy of Sciences and can affirm that they are conspecific. Although Cockerell claimed this species to be related to those of tropical Mexico, this is not true. On the basis of currently available specimens *H. sonorensis* ranges from the Death Valley region of California and Nevada into southern Arizona, thence south into Sonora, Mexico at least as far as Guaymas. Another extension intrudes into Baja California at least as far as Bahia de Los Angeles.

The variety *melanorhinus* was distinguished by the lack of a supraclypeal mark and the reduction of the clypeal macula to a transverse apical band with a median upward extension. In the "typical" form the apical third of the clypeus was pale yellowish with a broad, cuneate upward extension. Such variants are common in the series of females available and there seems to be no good reason for the recognition of these variant forms, since the variations are not correlated with distribution.

Distribution.—*MEXICO. Baja California del Norte*: 2 ♂♂, Bahia de los Angeles, May 14, 15, 1949 (R. C. Dickson; UCR), one on *Prosopis glandulosa. Sonora*: 1 ♀, Guaymas, April 8, 1921 (E. P. Van Duzee; CAS, type of *H. s. melanorhinus*); 1 ♀, Guaymas, April 10, 1921 (E. P. VanDuzee; CAS, type of *H. sonorensis*). *UNITED STATES. Arizona*: 4 ♂♂, 2 ♀♀, Alamo Cyn., Organ Pipe Cactus Natl. Mon., April 15, 1955 (G. D. Butler and F. G. Werner; UA), on mesquite; 1 ♀, same data, except on *Encelia* (UA); 1 ♀, Sabino Cyn., Santa Catalina Mts., May 26, 1962 (F. D. Parker and L. A. Stange; UCD). *Nevada*: 1 ♂, Aurora, 7500′, Mineral Co., August 9, 1939 (W. D. Pierce; LACM), on *Scrophularia californica. California*: 3 ♂♂, 6 ♀♀, Surprise Cyn., Panamint Mts., Inyo Co., April 22, 1957, on *Eriogonum inflatum*; 2 ♂♂, 9 ♀♀, same locality and host, April 23, 1957; 1 ♂, same locality, April 23, 1957, on *Stanleya pinnata*; 3 ♂♂, 16 ♀♀, same locality, April 25, 1957, on *E. inflatum*; 1 ♂, same locality, April 25, 1957, on *Prosopis*; 2 ♂♂, same locality, April 25, 1957, on *S. pinnata*; 2 ♂♂ same locality, April 28, 1957, on *S. pinnata*; 2 ♂♂, same locality, April 29, 1957, on *S. pinnata* (*all* P. H. Timberlake; UCR); 14 ♀♀, 9 ♂♂, same locality, April 24, 1957 (P. D. Hurd and G. I. Stage), on *E. inflatum*; 2 ♂♂, same locality, April 28, 1953 (P. D. Hurd); 3 ♂♂, same locality and date (G. A. Marsh), one on *Eucnide urens*, two on *Eriogonum* sp.; 1 ♀, Furnace Cr., Death Valley, Inyo Co., March 3, 1953 (J. W. MacSwain); 1 ♀, Cronise Valley, San Bernardino Co., April 29, 1956 (M. Wasbauer), on *Prosopis*; 2 ♂♂, Plaster City, 15 mi. N., Imperial Co., March 27, 1961 (C. A. Toschi; *all* CIS).

Hylaeus (*Paraprosopis*) *lunicraterius*, new species

Figures 7I; 8I; 10H; 12A.

This species is very closely related to the following species. The males are especially similar in details of the hidden ventrites and genitalia.

Diagnosis: Female with head as broad as long; clypeus immaculate; facial foveae ending about one-third of distance between eyes and ocelli; mesopleural punctures separated by less than one-third a puncture diameter, uniform in size; propodeal disc roughened and with scattered oblique rugulae; punctures of first tergite dense, coarser than those of second. Male with head as broad as long; lateral face marks ending abruptly a little above level of antennal sockets; supraclypeal mark present; lower part of face coarsely punctate; apical portion of tergites II-VI broadly impressed, margins slightly reflexed.

Male.—Integument black, with pure white maculae as follows: clypeus; quadrate supraclypeal mark; lateral marks to a point ending about an antennal socket diameter above upper margin of antennal sockets; medially interrupted stripe on pronotal collar; pronotal lobe; anterior tegular spot; minute apical spot on all femora; complete stripe on anterior tibiae; basal and apical spots on mid and hind tibiae; all basitarsi, except small ferruginous apical spot; tibial spurs. Wings hyaline, veins and stigma brown. Scape entirely dark, flagellum light ferruginous beneath. Erect pubescence whitish.

Head: UFD 0.71-0.79 x FL; LFD 0.58-0.61 x UFD; OCD 1.05-1.17 x TFD. Distance from laterobasal clypeal angle to eye margin 1.3 times basal clypeal width; distance between antennal sockets slightly less than a socket diameter, distance from sockets to eye margins about equal to a socket diameter. Facial integument somewhat shining, maculate areas moderately coarsely punctate, punctures separated by one-third to three-fourths a puncture diameter on sides of face, the punctures somewhat elongate, linearly arranged; clypeal punctures more rounded, separated by about one-half a puncture diameter; frontal area slightly swollen, coarsely, closely punctate, the punctures for the most part clearly defined; vertex coarsely punctate laterally, the punctures a little larger than those of frons; ocellar triangle and occiput in middle dull, densely tesselate, contiguously punctate. Scape distinctly flattened, greatest width about one-half its length, median flagellar segments about as long as broad.

Thorax: Mesoscutal punctures a little smaller than those of clypeus, separated by half a puncture diameter or less; mesoscutellar punctures a little coarser, separated by about half a puncture diameter; metanotum densely tesselate and roughened, with a few obscure punctures; mesopleural punctures about equal to those of mesoscutellum, separated by about one-fourth a puncture diameter. Basal area of propodeum coarsely areolate, the areolae finer laterally; transverse and oblique carinae obsolescent; lateral area roughened, with some indistinct punctures, a few fine rugae below at the sides.

Abdomen: Tergite I shining, coarsely punctate, punctures separated by about a puncture diameter, with scattered micropunctures; tergite II more finely punctate, duller, punctures separated by one-half to three-fourths a puncture diameter; apical one-third depressed, very finely and sparsely punctate, apical margin slightly reflexed; ventrites VIII and IX as illustrated (figures 10H and 12A).

Length, to apex of second tergite, 3.8-4.3 mm.; of forewings, 3.15-3.50 mm.

Female.—Integument black, except yellowish-white maculae as follows: lateral face marks, ending slightly above level of antennal sockets; interrupted stripe on pronotal collar; pronotal lobe; spot anteriorly on tegulae; minute apical spot on femora; basal spot on all tibiae; tibial spurs. Underside of flagellum light ferruginous. Erect pubescence whitish. Wings hyaline, veins and stigma brown. A very minute ferruginous to yellowish preapical spot sometimes present on clypeus.

Head: UFD 0.71-0.78 x FL; LFD 0.62-0.69 x UFD; OCD 0.81-0.92 x TFD. Basal margin of clypeus about 1.8 times as wide as distance from laterobasal angle to eye margin; distance between antennal sockets about 1.4 times a socket diameter; distance between sockets and eye margin slightly exceeding a socket diameter. Clypeus reticulate-lineolate, with fine punctures separated by a puncture diameter or more; supraclypeal area lineolate, with punctures separated by about a puncture diameter; maculate portions of face finely punctate, punctures somewhat elongate, linearly arranged; frontal punctures coarse, contiguous, becoming finer toward midline; occiput and ocellar triangle densely tesselate between coarse, close punctures; genae striatopunctate. Median flagellar segments broader than long.

Thorax: Mesoscutum dull, finely tesselate with punctures subequal to those of clypeus, separated by one-third a puncture diameter or less; mesoscutellar punctures about equal to those of mesoscutum, separated by about one-half a puncture diameter; metanotum somewhat granulose, punctures subequal to those of mesoscutum, separated by a puncture diameter or more; mesopleural punctures finer than those of clypeus, separated by about one-half a puncture diameter; propodeal basal area coarsely areolate, the areolae finer laterad; transverse carina present by poorly indicated, oblique carina barely evident; lateral areas strongly roughened; disc obliquely striolate.

Abdomen: Tergite I smooth, shining, finely punctate, punctures separated by a puncture diameter or more; tergite II smooth, shining, very finely punctate, punctures separated by one and one-half to two times a puncture diameter.

Length, to apex of second tergite, 3.95-4.35 mm., of forewings, 3.70-3.95 mm.

Holotype male, allotype female (Los Angeles County Museum of Natural History); Craters of the Moon National Monument, Idaho, Aug. 21, 1964 (D. S. Horning, Jr.), on *Chrysothamnus nauseosus.*

Paratypes, all from the type locality, collected by D. S. Horning, Jr., dates ranging from July 3 to Sept. 5: 23 ♂♂, 12 ♀♀. Host associations: *Chryso-*

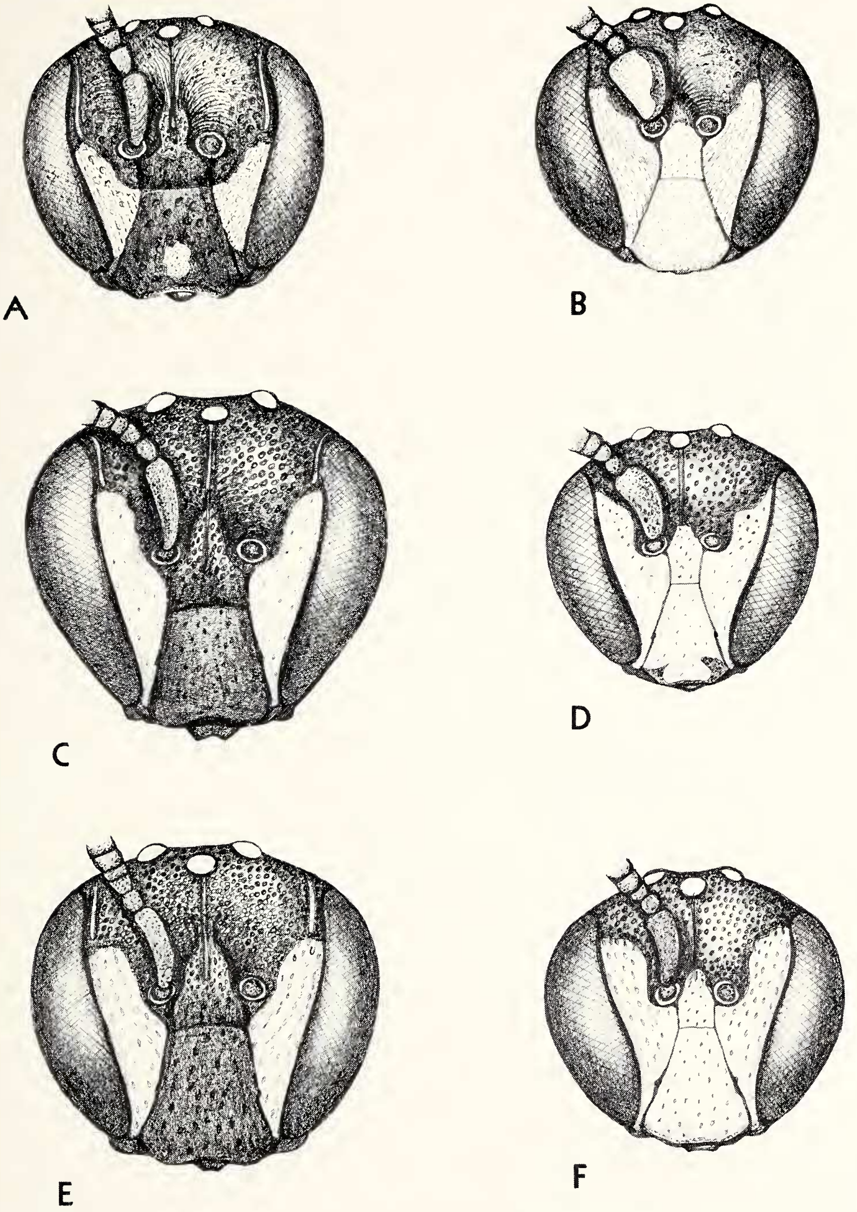

Figure 9. *Hylaeus* (*Paraprosopis*) spp., faces: A, *H. georgicus*, female; B, same, male; C, *H. asininus*, female; D, same, male; E, *H. megalotis*, female; F, same, male. Figures by Ruth A. DeNicola.

thamnus viscidiflorus, C. nauseosus, Chamaebatiaria millefolium, Senecio serra, Eriogonum ovalifolium, Phacelia leucophylla and *Populus tremuloides*; two males taken on Aug. 17, 1965 are marked "prey of Ph-2." Paratypes in United States National Museum, University of Idaho and the Los Angeles County Museum of Natural History.

The specific name for this species is derived from the type locality.

Hylaeus (*Paraprosopis*) *timberlakei* Snelling, NEW SPECIES

Figures 7J; 8J; 10J; 12B.

This species bears a strong resemblance to *H. calvus* in most features. The male differs from that of *H. calvus* externally in having the punctures on the dorsal surface of the first tergite sharply defined, the interspaces smooth and shining, while in *H. calvus* the punctures are obscured due to the strongly tesselated and roughened interspaces. The female of *H. timberlakei* has the declivity of the propodeum with coarse, oblique rugulae (absent or poorly defined in *H. calvus*) and the punctures of the first tergite are moderately dense and distinctly larger than those of the second tergite (sparse, finer than those of second tergite in *H. calvus*).

Diagnosis: Female with head broader than long; clypeus maculate; facial foveae ending slightly less than halfway between eyes and ocelli; punctures of mesopleura separated by more than a puncture diameter, uniform in size; rugulae of propodeal declivity coarse, obliquely directed toward mid-line; punctures of first tergite dense, distinctly larger than those of second tergite. Male with head slightly broader than long; lateral face marks ending rather broadly on eye margin about midway between level of antennae sockets and median ocellus; supraclypeal mark present; punctures on lower part of face coarse; apical margin of second tergite broadly impressed, very finely and sparsely punctate.

Male.—Integument black, with creamy-white maculae as follows: clypeus; triangular supraclypeal mark; lateral face marks, ending broadly on inner eye margins, about midway between level of antennal sockets and middle ocellus; pronotal collar, interrupted medially; spot on pronotal lobe; anterior spot on tegulae; small apical spot on all femora; complete outer stripe on anterior tibiae; basal and apical spots on middle and hind tibiae; all basitarsi (usually with distinct apical infuscation). Anterior medio- and distitarsi ferruginous, middle and hind medio- and distitarsi fuscous to black. Tibial spurs yellowish. Wings, hyaline, veins and stigma brownish. Scape all black; pedicel with reddish-yellow apical spot beneath; flagellum yellowish beneath, reddish-brown above. Erect pubescence whitish.

Head: UFD 0.70-0.77 x FL; LFD 0.50-0.61 x UFD; OCD 1.00-1.11 x TFD. Distance from latero-basal clypeal angle to eye margin 1.3 times basal clypeal width; distance between antennal sockets slightly more than a socket diameter, distance from sockets to eyes slightly more than a socket diameter.

Facial integument dull, maculate areas coarsely punctate, punctures separated by a puncture diameter or less; frontal area slightly swollen, coarsely rugosopunctate; vertex and genae coarsely continguously punctate. Scape somewhat distinctly flattened, greatest width about one-half its length; median flagellar segments about as long as broad, or slightly longer.

Thorax: Mesoscutal punctures finer than those of vertex, separated by half a puncture diameter or less, interspaces tesselate and dull; punctures of mesoscutellum coarser than those of mesoscutum, about equal to those of vertex, separated by about half a puncture diameter on disc, apical one-fifth of the segment dull, densely rugosopunctate; metanotum dull, rugosopunctate; mesopleural punctures about equal to those of mesoscutellum, separated by one-fourth a puncture diameter or less. Basal area of propodeum areolate, the ridges sharply defined by very irregular; lateral area rugulose; disc rugulose laterally, with a few poorly defined oblique rugae medially; transverse carina present across basal area, oblique carina poorly defined. Outer margin of fore coxa subangulate basally to evenly convex.

Abdomen: Tergite I shining, densely punctate, punctures a little smaller than those of mesoscutum, separated by one-half to three-fourths a puncture diameter; punctures of tergite II a little finer, separated by about one-half a puncture diameter or less; apical one-third to one-fourth of tergite II depressed, brownish, transversely lineolate, with scattered very fine punctures; ventrites VIII and IX as illustrated (figures 10J and 12B).

Length, to apex of second tergite, 3.8 to 4.3 mm.; of forewings, 2.6 to 3.0 mm.

Female.—Integument black, except for yellow maculae as follows: median clypeal macula, varying from small preapical spot to broad vertical stripe, broad lateral face marks, ending slightly above antennal sockets; medially interrupted stripe on pronotal collar; large spot on pronotal lobe; triangular spot anteriorly on tegulae; basal spot on all tibiae. Underside of flagellum light reddish. Erect pubescence whitish. Wings hyaline, veins and stigma brownish.

Head: UFD 0.77-0.84 x FL; LFD 0.61-0.66 x UFD; OCD 0.81-0.91 x TFD. Basal margin of clypeus 1.5 times as wide as distance from laterobasal angle to inner margin; distance between antennal sockets 1.5 times a socket diameter; distance from socket to eye margin 1.3 times a socket diameter. Clypeus finely reticulate, with small punctures over most of the disc separated by about a puncture diameter, becoming denser, coarser, more elongate toward apical margin; supraclypeal area lineolate, somewhat roughened above, with scattered obscure punctures; maculate portions of sides of face lineolate, with fine punctures separated by one-half to a full puncture diameter; frons coarsely, contiguously punctate, becoming finely, but very densely punctate on vertex, especially in ocellar triangle and behind; genal punctures obscure, a little larger than those of clypeus. Flagellar segments broader than long.

Thorax: Mesoscutum dull, finely tesselate with punctures finer than those of frons, separated by about one-half a puncture diameter on disc; mesoscutellum a little shinier, punctures variable, but mostly about same size as those of mesoscutum, some a little larger, mostly separated by about a puncture diameter; metanotum dull, rugulose; mesopleura bipunctate, *i.e.*, with punctures of two sizes, the larger ones equal to those of mesoscutum, punctures variably spaced, but most separated by about a puncture diameter. Basal zone of propodeum coarsely areolate; transverse, oblique and lateral carinae distinct; disc finely rugulose above, the rugulae becoming coarser, oblique, below. Outer margin of fore coxa evenly convex, without basal angulation or spine.

Abdomen: Tergite I shining, smooth, finely punctate, the punctures separated by a puncture diameter or more; tergite II shining, very finely reticulate, punctures finer than those of tergite I, separated by from one to one and one-half times a puncture diameter; remaining tergites increasingly more distinctly reticulate, with scattered micropunctures.

Length, to apex of second tergite, 4.5-5.1 mm.; of forewings, 3.5-4.0 mm.

Holotype: Male (Los Angeles County Museum of Natural History); Forest Hill, 12 mi. E., Placer Co., Calif., June 24, 1962 (R. R. Snelling), on *Ceanothus*. Allotype: Female (University of California, Riverside); Tyler, 4.5 mi. W., Nevada Co., Calif., Sept. 27, 1956 (P. H. Timberlake), on *Haplopappus*.

Paratypes (all California): 8 ♀♀, same data as allotype (UCR); 1♀, Goodyear's Bar, Sierra Co., Calif., Aug. 11, 1963 (E. J. Montgomery; UCD); 1 ♀, Buckhorn, Amador Co., July 25, 1955 (E. I. Schlinger; UCD); 8 ♂♂, Boca, Nevada Co., June 25, 1961 (F. D. Parker; UCD); 1 ♂, same locality, June 26, 1960 (F. D. Parker; UCD); 1 ♂, same locality, June 26, 1960 (A. S. Menke; UCD); 1 ♂, Pollock Pines, Eldorado Co., Aug. 9, 1957 (E. I. Schlinger; UCD); 1 ♂, Long Barn, 2.5 mi. W., Tuolumne Co., July 29, 1960 (G. I. Stage; GIS); 1 ♀, Camp Bob MacBride, 5400′, near Pinecrest, Tuolumne Co., Aug. 1, 1952 (R. R. Snelling; LACM), on *Solidago californica*; 10 ♂♂, Shasta Co., May 2, 1913 (F. W. Nunenmacher; CIS, LACM); 1 ♂, 1 ♀, Eagle Creek, Trinity Co., Aug. 12, 1952 (H. L. Hansen; CIS).

This species is dedicated to Professor P. H. Timberlake, in recognition of his eminence in apoid systematics, and of the generous assistance he has given to me over many years. Professor Timberlake had recognized this species as new and with characteristic generosity permitted me to describe it.

VARIATION: In the females, the clypeal maculation varies a great deal. Some have the spot so minute as to be barely perceptible and other have it so developed as to occupy as much as 75% of the total area. The Eagle Creek female has the rugulae of the propodeal declivity confined to the lower one-third. The males of this species are remarkably uniform structurally. They do possess a melanic form which strongly resembles that of such species as

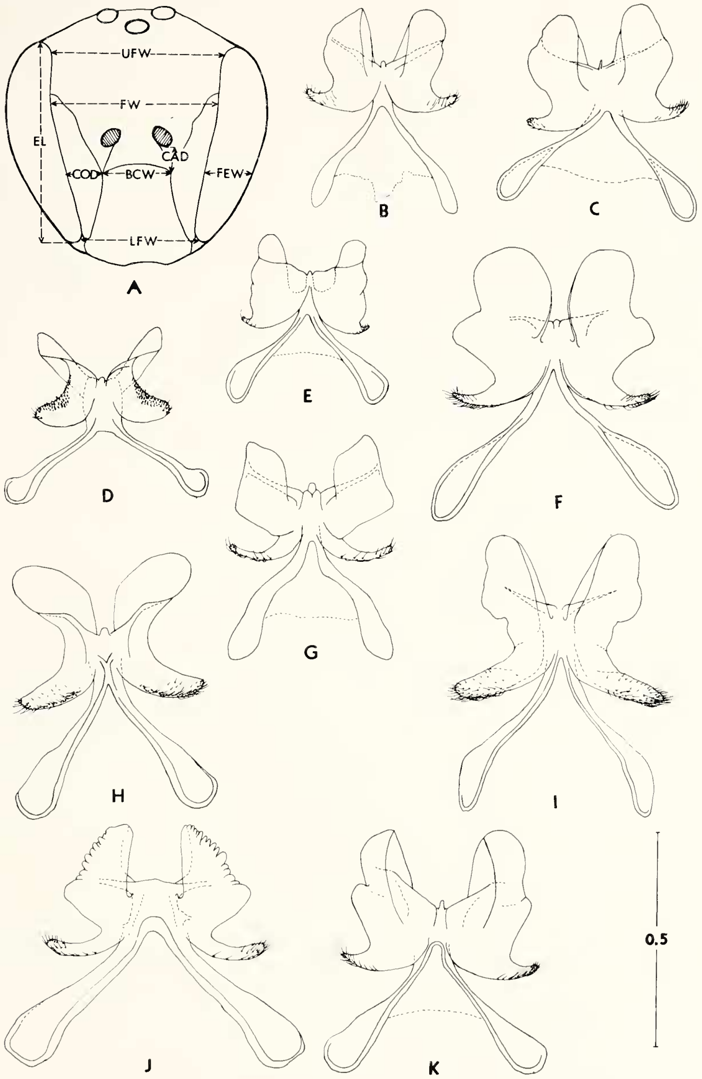

Figure 10. *Hylaeus* (*Paraprosopis*) spp. A, female face, illustrating methods of obtaining measurements used in text: BCW = Basal Clypeal Width; CAD = Clypeo-Antennal Distance; COD = Clypeo-Ocular Distance; EL = Eye Length; FL = Facial Length; FW = Facial Width; FEW = Frontal Eye Width; LFW = Lower Facial Width; SCQ = Supra-clypeal Quadrangle; UFW = Upper Facial Width. B-K, sternite VIII of males: B, *H. wootoni*; C, *H. floridanus*; D, *H. nevadensis*; E, *H. cookii;* F, *H. coloradensis*; G, *H. polifolii*; H, *H. lunicraterius*; I, *H. personatellus*; J, *H. timberlakei;* K, *H. sonorensis.*

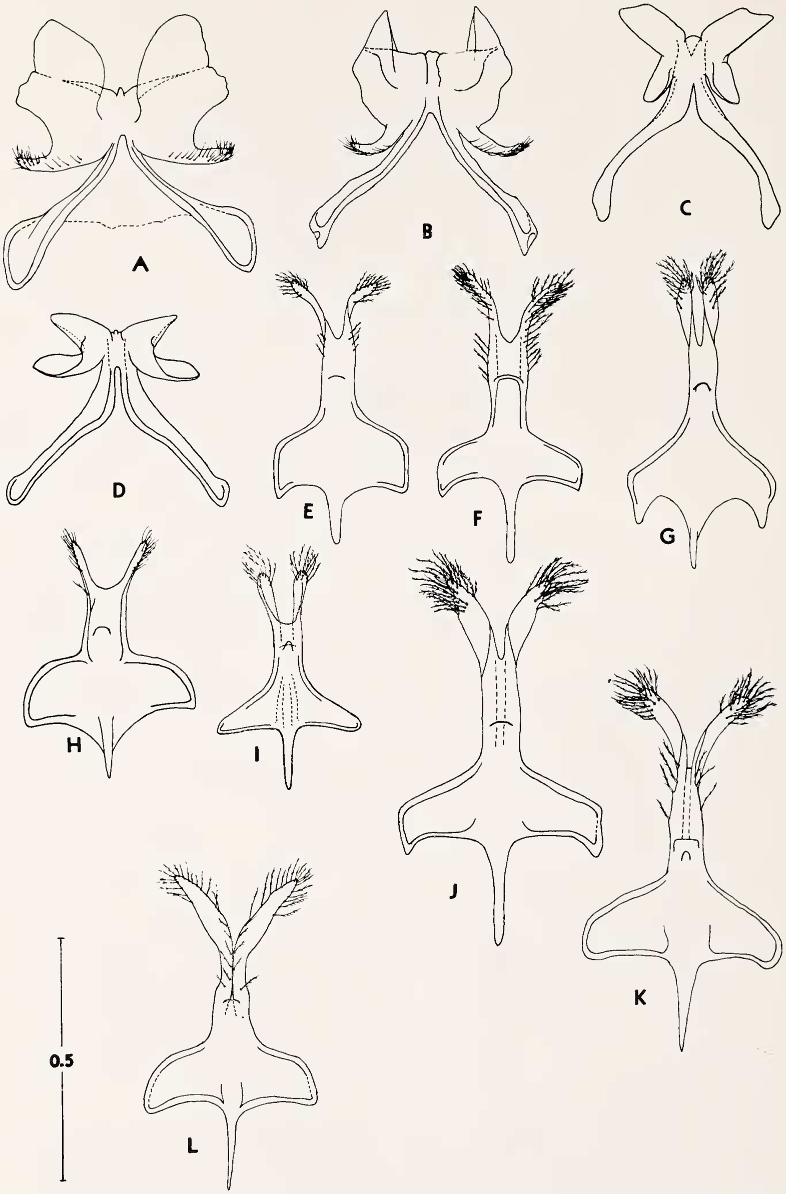

Figure 11. *Hylaeus* (*Paraprosopis*) spp., sternite VIII of males: A, *H. megalotis*; B, *H. asininus*; C, *H. calvus*; D, *H. georgicus*. E-L, sternite IX of males: E, *H. wootoni*; F, *H. floridanus*; G, *H. polifolii*; H, *H. nevadensis*; I, *H. cookii;* J, *H. coloradensis*; K, *H. personatellus*; L, *H. sonorensis*.

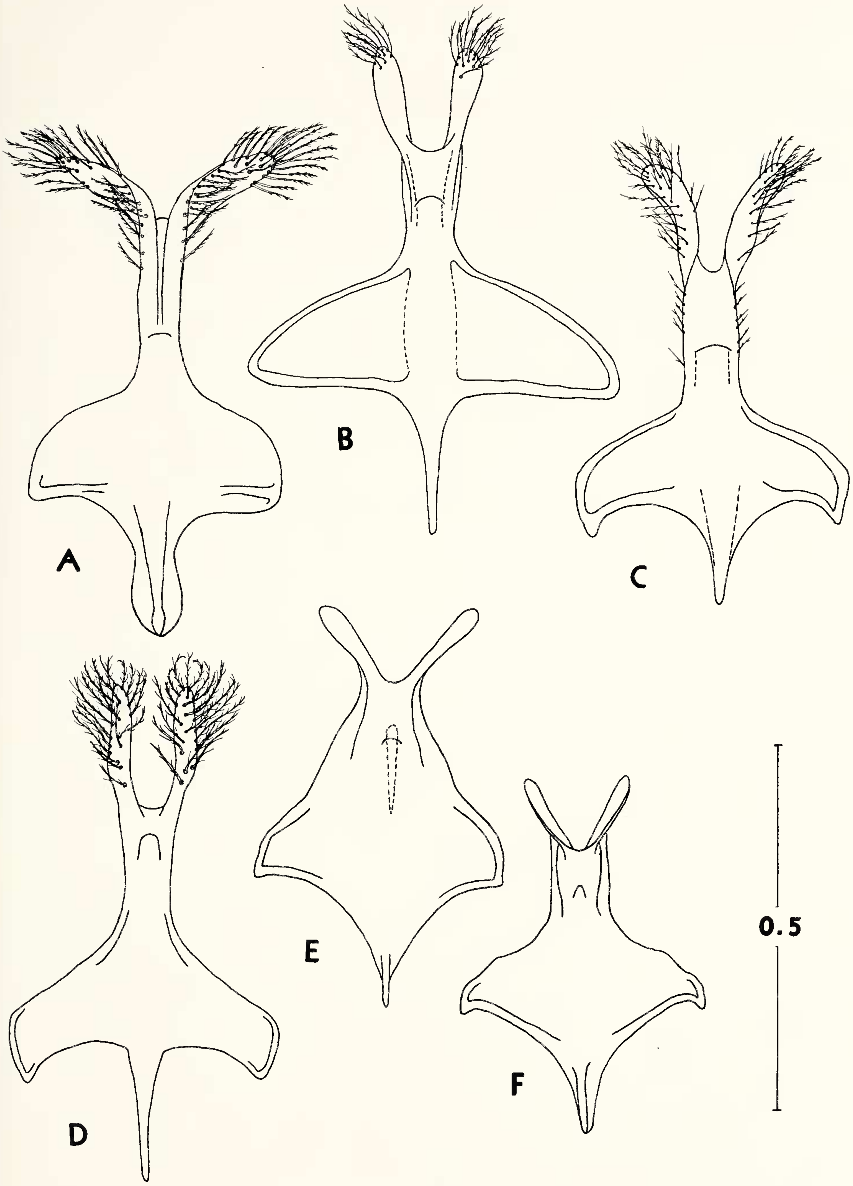

Figure 12. *Hylaeus* (*Paraprosopis*) spp., sternite IX of males: A, *H. lunicraterius*; B, *H. timberlakei*; C, *H. megalotis*; D, *H. asininus*; E, *H. calvus*; F, *H. georgicus*.

H. calvus and *H. polifolii*, but may be separated from these by the characters in the key.

Hylaeus (*Paraprosopis*) *calvus* (Metz)

Figures 7K; 8K; 11C; 12E.

Prosopis rudbeckiae, Metz, 1911. Trans. Amer. Ent. Soc., 37:111-114. ♀ (*in part*).

Prosopis calvus Metz, 1911. *Op. cit.* :143-144. ♂.

This common species ranges from southern Oregon to northern Baja California. A disjunct population exists in north central Arizona. In California *H. calvus* occurs through much of the Upper Sonoran area, along the coast ranges and the eastern foothills of the Sierra Nevada. Although in flight from early April until the middle of July it is most abundant during May and June. The females are often taken in large numbers at flowers of various chaparral shrubs such as *Rhamnus, Eriodictyon, Rhus* and *Ceanothus.*

The following are the marginal localities known to me for *H. calvus*: MEXICO. *Baja California del Norte*: 1 ♀, Encinas, 4 mi. S., Sierra San Pedro Martir, VI-2-1958 (J. Powell; CIS). UNITED STATES. *Oregon*: 2 ♂♂, Griffin Creek, Jackson Co., VI-6-1957 (C. Fitch; UCD). *Nevada*: 1 ♂, 1 ♀, Verdi, Washoe Co., VI-25-1961 (F. D. Parker; UCD). *Arizona*: 1 ♂, Parker Creek, Sierra Ancha, V-4-1947 (H. and M. Townes); 4 ♂♂, 1 ♀, Oak Creek Canyon, Coconino Co., V-16-1947 (H. and M. Townes); 1 ♂, same locality and collectors, V-19-1947; 1 ♂, 2 ♀♀, same locality and collectors, V-20-1947; 1 ♀, same locality, VI-26-1950 (L. D. Beamer; all UK).

This is one of the least variable of our species of *Paraprosopis* and one of the most easily recognized. In the female the combination of maculate clypeus, angularly produced laterobasal angle of the anterior coxae, shining, sparsely punctate mesopleurae and sparsely punctate abdomen are diagnostic. Typical males may be recognized by the lateral face marks truncate at the level of the antennal sockets, the finely, sparsely punctate shining mesopleurae and dull, densely tesselate abdomen. Males of this species, as well as those of *H. nevadensis* and *H. polifolii*, may have the clypeal borders broadly infuscated and the lateral face marks strongly narrowed above, ending acutely on the eye margin. Such males of this species may be recognized by the shining mesopleurae and dull abdomen with the punctures obscured by the dense tesselation.

Hylaeus (*Paraprosopis*) *georgicus* (Cockerell)

Figures 9A; 9B; 11D; 12F.

Prosopis georgica Cockerell, 1898. Psyche, 7 (suppl.): 438. ♂.

Prosopis georgica var. *leeana* Cockerell, 1909. Annals and Magazine of Natural History, (ser. 8) 4:27. ♂.

Hylaeus (*Metziella*) *hydrangeae* Mitchell, 1951. Jour. E. Mitchell Sci.

Soc., 67:244. ♀; Mitchell, 1960. N. Car. Agr. Exp. Sta. Tech. Bul. 141:60, 79; Snelling, 1968. L. A. Co. Mus. Nat. Hist., Contrib. Sci., 144:3, 4. NEW SYNONYMY.

A careful reappraisal of the characters of *H.* (*Metziella*) *hydrangeae* has convinced me that this is actually the previously unrecognized female of *H. georgicus.* Both sexes were associated by me on the basis of a series of specimens from Texas before I realized that the females were conspecific with *H. hydrangeae.* In the Texas material two characteristics are outstanding: the greatly elongated basal zone of the propodeum and the extremely fine abdominal punctation. The angulate laterobasal angle of the fore coxa is much more pronounced in the female than in the male, but this is true also of these sexes of *H. calvus.* The propodeal structure of the female, while aberrant for a *Paraprosopis* is much more similar to that of other *Paraprosopis* than it is to that of the subgenus *Metziella.* In my paper on that subgenus (Snelling; 1968) I included *H. hydrangeae* because at that time there seemed no good reason not to do so. This is now obviously incorrect inasmuch as the male of this species is, aside from propodeal structure, a perfectly typical *Paraprosopis.*

The distribution of this species is limited. From New York it extends south to Florida and west to south central Texas. Mitchell (1960) recorded males from Ithaca, New York and Raleigh and Wake Co., North Carolina. The female was recorded (as *H. hydrangeae*) from Cruso, North Carolina. Snelling (1968) recorded a female (as *H. hydrangeae*) from Ft. Gordon, Georgia. Cockerell described *H. georgicus leeana* from males taken by Birkmann in Lee County, Texas. Additional specimens, including both sexes, have been examined which were collected in Lee County by Birkmann. In addition to the above I have examined the following: 1 ♂, Augusta, Richmond Co., Georgia, 11-IV-1959 (R. R. Snelling; LACM), on *Crataegus*; 1 ♀, Gadsden Co., Florida, 11-IV-1960 (H. V. Weems; FPB), on *Crataegus*; 1 ♀, Hwy. 269, 8 mi. S. Chattahoochee, Gadsden Co., 6-IV-1955 (D. C. L. Gosling & party; MSU); 1 ♀, Torreya State Park, Liberty Co., Florida, 12-IV-1960 (H. A. Denmark; FPB), on *Crataegus*; 1 ♂, Lexington, Lee Co., Texas, 24-III-1951 (C. D. Michener; KU), on *Salix*; 2 ♂ ♂, Luling, Caldwell Co., Texas, 30-III-1951 (L. D. Beamer; KU), on *Salix.*

Hylaeus (*Paraprosopis*) *megalotis* (Swenk and Cockerell)

Figures 9E; F; 11A; 12C.

Prosopis megalotis Swenk and Cockerell, 1910. Ent. News, 21:69-70. ♂ ♀.

This very distinctive species was originally described from a series of specimens from Glen, Sioux County, NEBRASKA and a single female from Fort Garland, COLORADO. The types were taken on *Cleome serrulata.* In addition to the types I have seen specimens of both sexes taken at the type locality on Aug. 28, 1959 (W. E. LaBerge and O. W. Isakson; UN) on

Solidago. The following are new records for this species. MONTANA: 13 ♀♀, Whitehall, Aug. 13, 1931 (J. Nottingham; KU). COLORADO: 1 ♀, Blue Mtn., Moffatt Co., Aug. 14, 1966 (G. F. Knowlton; USU). UTAH: 1 ♀, Castle Dale, Emery Co., Aug. 10, 1957 (C. D. Michener; KU), on *Cleome serrulata*; 2 ♂♂, 7 ♀♀, Clear Creek Canyon, Box Elder Co., June 11, 1954 (G. F. Knowlton; KU); 1 ♂, Hanksville, Wayne Co., Sept. 11, 1938 (G. F. Knowlton, F. C. Harmston; USU); 1 ♀, Eureka, Juab Co., Aug. 6, 1958 (G. E. Bohart; USU), on *Chrysothamnus*; 8 ♀♀, Manila, Daggett Co., Aug. 11, 1962 (G. E. Bohart; USU). ARIZONA: 1 ♀, Painted Desert, Apache Co., Aug. 18, 1958 (G. I. Stage; LACM), on *Eriogonum aureus*.

The female of this species is easily recognized by its complete pronotal macula and the elongate apical mandibular tooth. This tooth is subject to wear, however, and in older individuals may not be noticeably elongate. The male is very similar to that of *H. asininus* but may be separated by the finely and sparsely punctate first tergite, the head about as broad as long (broader than long in *H. asininus*) and by the gradually, rather than abruptly, depressed apico-lateral portion of the second tergite.

SPECIES OF UNCERTAIN POSITION

Hylaeus (*Paraprosopis*) *suffusus* (Cockerell)

Prosapis suffusus Cockerell, 1896. Psyche, 7 (supl.): 32 ♂.

This name is based on a single male from an unknown locality in Nevada. Although the type should be in the collections of the Academy of Natural Sciences, Philadelphia, it is apparently lost or destroyed. If the type cannot be found, it seems best to drop the name altogether since the species cannot be determined from the original description alone. The present assignment to the subgenus *Paraprosopis* is also tentative.

Hylaeus (*Paraprosopis*) *tuertonis* (Cockerell)

Prosopis tuertonis Cockerell, 1906. Bul. Amer. Mus. Nat. Hist., 22: 423-424. ♀.

This species was described from two females, one from Tuerto Mountain, near Santa Fe, New Mexico, and one from Florissant, Colorado. I have not seen these specimens, and the original description offers little information of use in identifying the species. It is probably correctly assigned to *Paraprosoips* and seems nearest to *H. wootoni*, of which it may be a synonym. The description applies equally well, however, to *H. cookii*. Until the types can be studied, the status of this name must remain uncertain.

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